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Natural Areas of the Chesapeake Bay Region

ECOLOGICAL PRIORITIES

Center for Natural Areas
Ecology Program
Smithsonian Institution

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NATURAL AREAS OF THE CHESAPEAKE BAY REGION :

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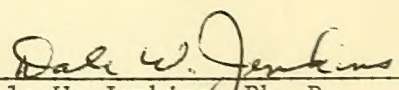
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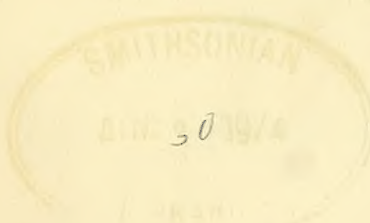
Center for Natural Areas

Ecology Program

Smithsonian Institution

May 1974


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Principal Investigator



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We would also like to thank Smithsonian staff who are not part of the Ecology Program but who nevertheless applied their valuable time and services to this effort, especially the energetic volunteers who came to us through the Smithsonian Associates volunteer program.

We are grateful to all those in the scientific community and other professions who have given their time and specialized competence to the study of natural history in the Bay region. We hope that they are all credited properly in the pages that follow.

Table of Contents

| | page |
|--|------|
| Acknowledgements | i |
| List of Tables | iii |
| List of Maps | iv |
| I. INTRODUCTION | 1 |
| Objectives | 4 |
| Survey Concept | 4 |
| Scope of Survey | 7 |
| Sources of Information | 7 |
| Staff | 10 |
| II. PRESENTLY PROTECTED AND PRESERVED LANDS | 11 |
| Protected Federal Lands | 13 |
| Protected State and Local Lands | 15 |
| Preserved Natural Areas | 18 |
| III. DEFINING THE NATURAL AREAS | 20 |
| Important Biotic Communities | 24 |
| Rare and Endangered Animals | 30 |
| Rare and Endangered Plants | 34 |
| Range Phenomena | 35 |
| Seasonal Concentration of Animals | 37 |
| Commercial Game and Unusual Animal Populations | 40 |
| Paleontological Features | 41 |
| Well-documented Sites | 42 |
| Exceptional Individuals or Associations | 42 |
| Size of Areas | 43 |
| IV. RANKING THE AREAS | 45 |
| On Methods | 45 |
| The Numerical Ranking System | 47 |
| Example of the Rating System in Use | 53 |
| V. MASTER LIST OF NATURAL AREAS (Colored Section). | 54 |
| Primary Natural Areas Recommended for Protection | 55 |
| Secondary Areas Recommended for Consideration | 73 |
| Index of Areas by State and County | 119 |
| Index of Areas by Alphabetical Order | 130 |
| REFERENCES | 141 |
| APPENDIX A - DESCRIPTION OF THE CHESAPEAKE BAY REGION | |
| APPENDIX B - BIOTIC COMMUNITIES OF THE CHESAPEAKE BAY | |
| APPENDIX C - RARE, ENDANGERED AND THREATENED VERTEBRATE SPECIES OF THE CHESAPEAKE BAY REGION | |
| APPENDIX D - RARE, ENDANGERED AND ENDEMIC PLANTS OF THE CHESAPEAKE BAY REGION | |
| APPENDIX E - PRESENTLY PROTECTED AREAS OF THE BAY REGION | |

LIST OF TABLES

| | page |
|---|------|
| 1. Agencies and Organizations Contacted in the Survey | 8 |
| 2. Presently Protected Areas of Chesapeake Bay Region | 12 |
| 3. Preserved Natural Areas | 19 |
| 4. Criteria and Quantitative Values for Selection of Natural Areas | 52 |
| 5. Master List of Natural Areas (Colored Section) | 55 |

LIST OF MAPS

| | <u>Page</u> |
|--|-------------|
| 1. Map of Chesapeake Bay Region | 6 |
| 2. Areas Currently Protected in Chesapeake Bay Region 1:250,000 | |
| 3. Zoological Factors of Ecological Importance in the Chesapeake Bay Region 1:250,000 | |
| 4. Botanical Factors of Ecological Importance in the Chesapeake Bay Region 1:250,000 | |
| 5. Areas Proposed for Preservation in the Chesapeake Bay Region 1:250,000 | |
| 6. Topographic Maps (280) of the Chesapeake Bay Region (7.5 minute USGS Quadrangles) 1:24,000 | |

These maps are on file at The Nature Conservancy, the Chesapeake Bay Foundation, and the Center for Natural Areas. Copies may be obtained from the Center by calling (202) 381-6568.

I. INTRODUCTION

Chesapeake Bay and its watershed comprise one of the most productive estuarine areas of the world. It is not altogether coincidental that the Chesapeake Bay region also supports one of the nation's fastest-growing populations. The result is that the land, especially along the coast, is sprouting residential, commercial and recreational developments at an accelerating pace.

In a region that historically has been heavily lumbered and extensively tilled, the present encroachments severely threaten what few undisturbed natural areas still remain -- bogs, mature forests, tidal wetlands, swamps, marshes and other areas of importance to plant life, wildlife, fisheries and man. It is a familiar litany in most parts of the United States.

Recently private groups and public institutions and governments have recognized the urgency of preserving natural areas of various kinds. A number of states have endeavored to inventory the natural lands within their borders as a necessary first step in enacting protective measures. For example, New Jersey is preparing detailed maps of its coastal wetlands to form the basis of stringent new laws regulating development. Among notable statewide inventories of natural areas are those of Wisconsin, Georgia, Illinois, Michigan and the New England states. About 30 states have some natural areas program underway.

Chesapeake Bay has not lacked such surveillance. A "Catalog of Natural Areas in Maryland" was prepared by the Maryland State Planning Department in 1968 and is presently (1973-74) being revised. This includes historical, geological and ecological areas for the entire state. Another report, "Integrity of Chesapeake Bay," done for Maryland, describes the Bay's problems and some goals for it in relation to water supply, pollution, population, recreation, transportation and industry.

A "Maryland Outdoor Recreation and Open Space Plan" was developed to provide recreation opportunities and guidelines for conserving and preserving depletable natural resources./ A few natural areas of high scenic or scientific value were earmarked for limited recreation use and for the preservation of unusual plant and animal species and extraordinary habitats.

In Virginia, a report called "Critical Environmental Areas" identifies, in a preliminary way, areas of natural, scenic or historic value which contribute to economic, esthetic or cultural well-being of individuals and society. Both Maryland and Virginia have published reports that propose rivers for official Scenic River designation and stress unique scenic, fish and wildlife, and other recreation values that warrant preservation and enhancement.

These and other studies that touch on Chesapeake Bay recommend the preservation of areas primarily to meet the greatly increasing demands for outdoor recreation. They, therefore, tend to treat biotic communities only in a general way. They consider ecological preservation and

values only as a requirement for maintaining the areas in a healthy and esthetically pleasing condition. Clearly, there are many legitimate uses and values of natural areas, from camping to insect observation and from boat-landings to bird sanctuaries, but some areas need to be set aside in their natural condition and left alone. If we are to preserve the Bay's tremendous ability to produce fish, shellfish, waterfowl and other important life; to break down human sewage wastes; and to carry out its many other functions, then we also have to preserve a significant number of breeding grounds, freshwater and salt-water marshes, and other areas of ecological significance. In short, in order to maintain the valuable natural yields of the Bay, we need to assure the maintenance of the Bay's natural integrity.

Not all of the Bay can be preserved, however. Growth of industrial and residential areas will continue, as will the expansion of recreational uses of the land and water. Faced with the reality that only limited preservation is possible, the ecologists' responsibility became apparent: to point out areas which should receive the highest priority in preservation efforts. Thus, as thoroughly surveyed as the Bay had been, there remained an urgent need to determine its *ecologically most important* plants, animals, biotic communities and natural areas. It is urgent that such areas be evaluated and priorities set for procurement and preservation.

Recognizing this need, The Nature Conservancy and the Chesapeake Bay Foundation established a grant of \$15,000 for an ecological survey of the Bay region. In July, 1972, the Ecology Program in the

Smithsonian Institution's Office of Environmental Sciences provided matching funds and established the Smithsonian Center for Natural Areas to undertake the task.

Objectives

Briefly stated, the task was this: on the basis of a new survey, to recommend for procurement those natural areas which Smithsonian personnel judged to be of highest priority for preservation action. This in turn called for the creation of a survey concept including an evaluation system -- a concept that could function within rather narrow limits of time (two years) and expenditure, and therefore make use of already available information. Also, the system for organizing the data and ranking the areas had to be flexible, to allow for additional details as they accumulated and for changes in the landscape as they occurred. Development rarely pauses for surveys of this kind: on several occasions in the course of the study, a prime natural area would be taken out of contention by development, and we would have to erase it from our maps. Finally, the new survey concept, it was hoped, would not only provide the data necessary for decision-making in the Chesapeake Bay region but also would serve as a model for similarly motivated surveys in other regions.

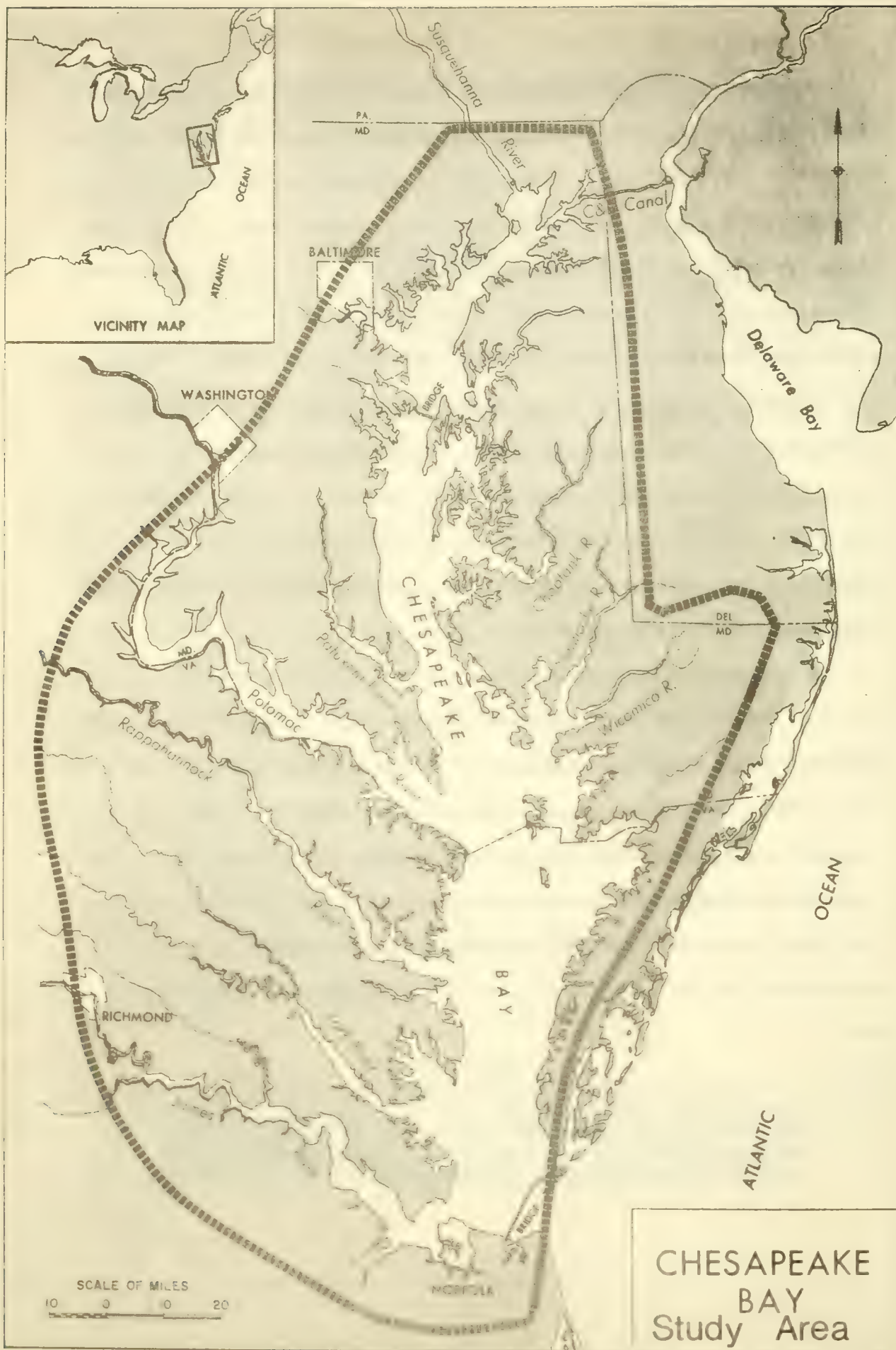
Survey Concept

The survey concept includes four fairly distinct phases. (1) It was first necessary to determine and map all of the areas in the

region which are presently protected from uncontrolled development and those which are properly preserved and managed as natural areas. (2) The second phase involved determining and mapping the locations of ecologically important and significant flora, fauna, biotic communities and ecosystems. This was done on the basis of a full literature search and of existing field studies and recommendations from available sources as well as preliminary field checks of the information thus received. (3) Selected ecological criteria were assigned numerical ratings and, by the use of overlay maps and a computerized data storage and retrieval system, all the locations noted from phase 2 were given a numerical rank. Thus, locations with the highest ecological value could be determined and proposed as the primary targets for procurement and other protective measures.

A final and crucial phase (4) was not within the scope of the contract for this study: it remains to conduct extensive field checks and feasibility studies of the proposed areas. The purpose of such fieldwork is threefold: to determine if the ecological information used in this study was accurate and up-to-date; to determine how vulnerable the proposed sites are to development and other intrusion; and to determine such matters as ownership, availability, cost of acquisition and the requirements for proper management after procurement.

NOTE: This survey should not be considered final or complete. Some prime natural areas may have been inadvertently missed which should have been included. The Center for Natural Areas welcomes any and all additional ecological information to improve its knowledge of the Bay region.



Scope of Survey

In this survey, the first three phases were accomplished including preliminary field checks on about 70 out of 232 areas, or 30 percent of the areas studied. The survey covers some 12,600 square miles (see map on page). The region includes the Chesapeake Bay drainage basin between the Pennsylvania and North Carolina state boundaries. It is bordered on the west approximately by the fall line, i.e., the line separating the coastal plain from the Piedmont area extending from Baltimore through Washington to Richmond. On the east, the boundaries include the Chesapeake Bay estuarine drainages (though not those draining to the Atlantic). Most of Delaware is excluded. While the study area includes the land adjacent to the tidal reach of the major rivers, it does not include the extensive drainage areas of the upper Potomac or Susquehanna Rivers.

Of the 12,600 square miles covered in the survey, 941 square miles were found to be in the category of 'already protected.' Some 534 square miles, in 232 separate sites, were identified as natural areas with potential need for protective action -- that is, about 4.2 percent of the total study area. Of these 232 sites, 64 have been placed in a high-priority category so that roughly 2 percent of the Bay region area is recommended for procurement or other preservation action.

Sources of Information

One of the results of this survey is an awareness on our part of the considerable amount of ecological and biological information already

available concerning the region. Our efforts have shown that in areas similarly endowed with published data, this kind of survey can be an effective means of making a rapid and inexpensive evaluation of natural areas. There are, of course, gaps in the available information -- and some of them are pointed out in the pages that follow -- but the region is blessed with much data and many individuals and organizations with considerable knowledge.

In the course of the survey, the Center for Natural Areas received invaluable data from the groups and organizations listed in Table 1.

Table 1. AGENCIES AND ORGANIZATIONS CONTACTED IN THE SURVEY

PRIVATE

American Fisheries Society
American Shore and Beach Preservation Society
Audubon Naturalist Society of the Central Atlantic States, Inc.
Audubon Society of Southern Maryland
Canoe Cruisers Association
Central Atlantic Environment Service
Chesapeake Bay Foundation
Citizens Committee on the Chesapeake Bay
Conservation Council of Virginia
Conservation Foundation, The
Federated Garden Clubs of Virginia
Garden Club of Virginia, The
Izaak Walton League (local chapters)
Junior League (local chapters)
Kent Conservation, Inc.
League of Women Voters (state chapters)
Maryland Environmental Trust
Maryland Wetlands Committee
Maryland Wildlands Committee
National Campers and Hikers Association
National Wildlife Federation (state chapters)

Nature Conservancy, The
Northern Virginia Conservation Council
Philadelphia Academy of Natural Sciences
Potomac River Association of St. Mary's County
Sierra Club (local chapters)
Talbot County Historical Society
Virginia Society of Ornithology
Wilderness Society, The
Wye Institute

MARYLAND

Maryland State Department of Natural Resources
Department of Chesapeake Bay Affairs
Departments of Forests and Parks
Fish and Wildlife Administration
Maryland Natural Resources Institute
Chesapeake Biological Lab (Solomon's Island),
University of Maryland
Maryland State Department of Planning

VIRGINIA

Commission of Game and Inland Fisheries
Commission of Outdoor Recreation
Virginia Institute of Marine Science
Virginia State Department of Conservation and Economic Development

FEDERAL

Department of Commerce
National Marine Fisheries Service, NOAA
Department of Defense
Air Force
Army (Baltimore District, Corps of Engineers)
Navy
Department of the Interior
U.S. Fish and Wildlife Service
U.S. Geological Survey (and CARETS program)
National Park Service
Smithsonian Institution
Chesapeake Bay Center for Environmental Studies

UNIVERSITIES

American University
Georgetown University
Johns Hopkins University
Old Dominion University
University of Maryland

Several organizations, such as the Audubon Naturalist Society of the Central Atlantic States, the Chesapeake Bay Foundation, the Maryland Ornithology Society and the Virginia Society of Ornithology, assisted the project staff on a voluntary basis by soliciting information and recommendations from their members who are directly familiar with the Chesapeake Bay area. Volunteers assisted in contacting other private groups, local officials, and individuals to obtain more detailed information on specific areas.

Staff

The staff of the survey all worked part-time; the total combined effort amounted to about three man-years. The survey staff and consultants were: Dale W. Jenkins, Ph.D., Director of the Ecology Program and principal investigator. Special consultants: Anne LaBastille, Ph.D., wildlife ecologist; Richard W. Wagner, Ph.D., Ecologist; Clyde Reed, Ph.D., Botanist; Edward F. Rivinus, M.A., Ornithologist.

Mr. Stephen L. Keiley, MBA, Director of the Center for Natural Areas. Fonda R. Hivick, M.A., Botanist, Russell Kologiski, B.S., Botanist, and Gary S. Waggoner, M.A., Ecologist, were involved in data gathering and evaluation. Interpretation and cartography were completed by Luis Calvo, Cartographer; David Kunhardt, B.A., Administrative Assistant; Bryan Thompson, MLA, Landscape Architecture; David Vreeland, B.S., Geographer, and J. Copperidge Wilson, B.S., Zoologist. Secretarial and clerical: Fay Davis, Willa Afshar, Karan Shaffer, Mary Kadziel.

II. PRESENTLY PROTECTED AND PRESERVED LANDS

About 941 square miles or over one-half million acres (just over 240,000 hectares) of land is presently protected in the Chesapeake Bay region by virtue of being owned either privately or by the federal or state governments. These lands may be subject to a variety of human activities from landing airplanes to lumbering, fishing, hunting or intense recreational uses. So, while they are not subject to unplanned, market-dominated real estate development, they are also not necessarily preserved in any true sense. In our opinion, these lands should be analyzed in greater depth and ranked according to the ecological criteria set forth in this report. Those found of prime value should then be so designated and action should be taken to change their management status to assure their protection in perpetuity. Such an analysis was not within the scope of this survey, on the grounds that these lands are, at the very least, protected from development and thus not as threatened as the others that formed the bulk of the survey.

A number of areas within the region are preserved, in the sense that damaging use or development is largely ruled out. These include seven National Wildlife Refuges plus seventeen other areas, some of them state parks or refuges and others being privately owned, (and listed in published reports as natural areas, research natural areas or natural landmarks).

None of these protected or preserved areas were actively investigated by us. They were, however, depicted on a 1:250,000 scale map with appropriate coding to show different categories of ownership and

management. This information is summarized in Table 2 and explained in the text which follows. It is interesting to note that already protected and preserved land in the region amounts to 7.5% of the entire study area. For a detailed listing of all these areas, consult Appendix E.

TABLE 2. PRESENTLY PROTECTED AREAS OF CHESAPEAKE BAY

| <u>Ownership</u> | <u>Number of Sites</u> | <u>Acres</u> | <u>Hectares</u> ¹ |
|--|------------------------|--------------|------------------------------|
| FEDERAL | | | |
| Military | 43 | 266,000 | 107,500 |
| National Wildlife Refuges ² | 8 | 32,400 | 13,100 |
| Other | 20 | 56,200 | 22,700 |
| STATE | | | |
| Forests | 5 | 20,750 | 8,380 |
| Parks | 36 | 56,760 | 22,930 |
| Wildlife Management Areas ³ | 30 | 78,700 | 31,800 |
| Other | 26 | 80,600 | 32,570 |
| PRIVATE OR QUASI-PUBLIC | 8 | 10,770 | 4,350 |
| <hr/> | | | |
| | Total | 602,200 | 243,300 |

¹The hectare is a unit of area in the metric system. One hectare equals 10,000 square meters or 2.471 acres. There are approximately 258 hectares per square mile.

²Includes some land not in the N.W.R. system but administered by the U. S. Department of Interior's Bureau of Sport Fisheries and Wildlife.

³Includes some land not in the W.M.A. systems but held with identical management practices. Also includes Virginia Natural Areas.

Protected Federal Lands

Military Lands. The Department of Defense has more public protected land in the Bay region than other Federal agencies. Topographic maps show that much military land is undeveloped forests, marshlands, and shorelines. Nine of the forty-three reservations and installations listed below contain or are directly adjacent to what we later determined to be valuable natural areas:

| Name | Location | Hectares |
|----------------------------------|------------------------|--------------|
| Aberdeen Proving Grounds (Army) | Harford Co., Md. | 13,445 |
| Fort George G. Meade (Army) | Anne Arundel Co., Md. | 5,252 |
| Navy Propellant Plant | Charles Co., Md. | 889 |
| Cedar Neck Naval Research Lab | Charles, Md. | 566 |
| Fort Belvoir (Army) | Fairfax, Va. | 2,707 |
| Dahlgren Weapons Lab (Navy) | King George, Va. | 1,495 |
| Fort Eustis Military Reservation | Newport News City, Va. | 2,304 |
| Plum Tree Island Bombing Range | York, Va. | 1,212 |
| U. S. Navy Transmitter Station | Nansemond Co., Va. | 323 |
| | | <hr/> 28,193 |

Four reservations enclose more than two-thirds of the total military acreage in the Bay region with a diversity of land-use potential:

| Name | Location | Hectares |
|---------------------------------|---|--------------|
| Aberdeen Proving Grounds (Army) | Harford Co., Md. | 13,445 |
| Fort George G. Meade (Army) | Anne Arundel Co., Md. | 5,252 |
| Quantico Marine Corps Schools | Prince William & Stafford Co's., Va. | 25,048 |
| A. P. Hill Military Reservation | Caroline | 28,967 |
| | | <hr/> 72,712 |

Public hunting and fishing is allowed in parts of some areas, such as Quantico and A. P. Hill reservations. The Department of Defense has created directives for the use of land and the services have shown an increasing sensitivity to ecological concerns (as evidenced by the Air Force effort to set ecologically sound management practices at their bases).

National Wildlife Refuges and Bureau of Sport Fisheries and Wildlife Land. Seven National Wildlife Refuges (N.W.R.) are in somewhat remote and naturally well-protected locations in the Bay. An eighth area was designated by both the Society of American Foresters and the Federal Committee on Research Natural Areas as a valuable natural area: the Patuxent Wildlife Research Center. These refuges constitute some of the better protected natural areas in the Bay.

| Name | Location | Hectares |
|-----------------------------------|--|-------------------------|
| Susquehanna N.W.R. | Harford Co., Md. | 1.5 land 4,050 water |
| Eastern Neck N.W.R. | Kent Co., Md. | 923 |
| Blackwater N.W.R. | Dorchester Co., Md. | 4,531 |
| Martin N.W.R. | Somerset Co., Md. | 1,786 |
| Patuxent Wildlife Research Center | Anne Arundel & Prince George's Co., Md. | 287 |
| Mason Neck N.W.R. | Fairfax Co., Va. | 580 |
| Presquile N.W.R. | Chesterfield | 536 |
| Fisherman's Island N.W.R. | Northampton Co., Va. | 404 |
| | | <hr/> 13,100 |

Other Federally-Owned and Administered Open Space. This class of land includes National Parks, a National Forest, and various other Federal areas. The parks range from the 3,810-hectare Colonial National

Historical Park of James City, Virginia, to the 35.5-hectare Theodore Roosevelt Island Memorial Park in the Potomac River at Washington, D. C. The fifteen parks have a total of approximately 9,211 hectares. Three of the parks, Theodore Roosevelt Island, the George Washington Memorial Parkway, and Colonial National Historical Park, contain marshland that is considered valuable natural land. Their prime function, however, is for tourists who seek historical and recreational establishments; conservation regulations are limited.

The Prince William Forest Park in Prince William County, Virginia is the only National Forest in the region. It covers 7,353 hectares and has moderate recreational use.

Other federal lands include the U. S. Department of Agriculture Research Station in Prince George's County which has over 3,878 hectares of land; and the Pamunkey Indian Reservation in King William County, Virginia which includes valuable wetlands and wildlife in its 404 hectares.

Protected State and Local Lands

State Forests. Five state forests in the Bay region in Maryland total approximately 8,400 hectares. The largest is the new and still growing Pocomoke State Forest in Worcester County. It has 5,600 hectares of land along and near the Pocomoke River. The state has designated the Pocomoke a Scenic River, and will expand forests and local parks along its banks. These state forests enjoy good protection with some restrictions on their use, but their numbers are few and none has been

established near the Bay in Virginia. The proper officials in each state should be contacted to ascertain state plans for further use and development of the forest systems.

State, local and regional parks. The park system in each state administers various historical, recreational and natural lands of several types. This category probably contains the widest variety of land uses. Only in the last five or six years has there been an official recognition of the need to preserve certain sites as Natural Areas rather than as recreation sites or camping grounds. Of the 20,000 hectares of parkland in 36 parks, we recommend that approximately 3,500 hectares within the following seven parks should be maintained in their natural state. More details of the sites recommended are shown on marked topographic maps in the Center for Natural Areas.

| Name | Location | Hectares |
|---------------------------------|--------------------------|-------------|
| Susquehanna State Park | Harford Co., Md. | 646 |
| Severn Run Natural Envir. Area | Anne Arundel Co., Md. | 640 |
| Wye Oak State Park | Talbot Co., Md. | 9 |
| Patuxent River State Park | Prince George's Co., Md. | 1,212 |
| Shad Landing State Park | Worcester Co., Md. | 220 |
| Chippokes Plantation State Park | Surry Co., Va. | 404 |
| Seashore State Park | Virginia Beach Co., Va. | 1,050 |
| | | <hr/> 4,181 |

Wildlife Management Areas. The State of Maryland has 20,000 hectares of Bay region land in its Wildlife Management System. The Commonwealth of Virginia, in both its Wildlife Management-/and Natural-Areas Systems, has 3,393 hectares in the Bay region. These systems include some lands not owned by the states but administered by them

under easement agreements. Public hunting is allowed in regulated seasons. In this category are some of the very large prime wetlands of the Eastern Shore of the Bay (some 14,000 hectares on the shore of four counties). These areas are more isolated and less used than the majority of the parks: most if not all of them can be considered valuable potential natural areas.

Other State, Regional and Local Lands. About 13,770 hectares of land and water have been categorized as undeveloped land. The greater part of this area, 10,630 hectares, consists of state and city reservoirs. Among the remainder are four tracts containing interesting natural areas:

| Name | Location | Hectares |
|---|-----------------------|-------------|
| Crownsville State Hospital | Anne Arundel Co., Md. | 384 |
| Eastern State Hospital Reservation | James City Co., Va. | 202 |
| Salt Ponds and Northend Point Natural Preserve | Hampton City, Va. | 303 |
| Elko Tract | Henrico Co., Va. | 808 |
| | | <hr/> 1,697 |

Private and Quasi-Public Properties. Privately protected lands, conservation easements, and holdings by small conservation-minded groups are not all compiled here. The Chesapeake Bay lands of the Nature Conservancy and the Smithsonian Institution are plotted on map 1. The Nature Conservancy's lands are well protected natural areas. Two properties which might be considered as preserves because of their prime natural value are:

| Name | Location | Hectares |
|-----------------------------------|--------------------------|-----------|
| Camp Rodney Scout Reservation | Cecil Co., Md. | 414 |
| Belt Woods (The Episcopal Church) | Prince George's Co., Md. | 16 |
| | | <hr/> 430 |

Belt Woods has been nominated by the Center to receive Registered Natural Landmark status from the National Park Service because of its unique stand of mature hardwoods and large bird population.

Preserved Natural Areas

The designation of preserved natural areas is difficult when dealing with state-owned lands since there are different types of preservation and protection. State and federal forests preserve flora and fauna but are subject to cutting, management and "multiple use." State and federal parks have much human use and are subject to management and partial development for recreation. The status of state and Federal wildlife management areas and refuges also varies inasmuch as they preserve wildlife and flora but are subject to changing management policies.

There are 17 sites which may be considered as designated natural areas, but this list should be considered as very tentative since some of the areas may not qualify as fully preserved natural areas.

The Nature Conservancy sites, the Natural Landmark areas, and the Smithsonian Institution areas can be considered as preserved natural areas. The State of Virginia has designated three natural areas-- Charles C. Steirly Natural Area, Parkers Marsh Natural Area, and Seashore Natural Area and these are fully preserved. The latter is also a state park with some tourist facilities and use.

TABLE 3. PRESERVED NATURAL AREAS

| | <u>Size of Area (Hectares)</u> | <u>Owner</u> | <u>Type of Area</u> | <u>Preservation</u> |
|--|------------------------------------|-------------------------|-------------------------|---------------------|
| Hellen Creek Hemlock Preserve, Md. | 36 | Nature Conserv. | Hemlock Outlier | Good |
| Alexander Berger Memorial Sanctuary, Va. | 346 | " | Diverse Veg. & Wildlife | Good |
| Hambleton Island | 11 | " | Virgin Cedar & Pine | Good |
| Battle Creek Cypress Swamp, Md. | 40 | " | Cypress Outlier | Good; Landmark |
| Charles C. Steirly Natural Area, Va. | 8 | State of Virginia | Cypress & Tupelo | Good |
| Long Green Creek Valley and Sweathouse Branch, Md. | 101 | State of Md. Park | Forests and Rivers | Good |
| Belt Woods, Md. | 16 | Episcopal Church | Virgin Mature Forest | Proposed Landmark |
| Parkers Marsh Natural Area, Va. | 307 | State of Virginia | Tidal Marsh | Good |
| Patuxent River Wildlife Research Center, Md. | 286 | BSFW | Forests and Wildlife | Good; SAF Area |
| Seashore Natural Area, Va. | 606 | Va. State Park | Dunes and Forests | Good; Landmark |
| Mill Creek Bird Sanctuary, Md. | 62 | Quasi-Public | Oak-Pine Forest | Good |
| Hock Tract, Md. | 6 | Md. State Road Com. | Virgin Forest | Good |
| Corcoran Tract (Part of Sandy Point State Park), Md. | 56 | Md. State Forest & Pk. | Virgin Oak & Pine | Good |
| Smithsonian Chesapeake Bay Center for Environmental Studies, Md. | 808 | Smithsonian Institution | Forests & Marshes | Good |
| LeCompte Bryant Fox Squirrel Refuge, Md. | 137 | Md. Dept. Game & Fish | Hardwood & Softwood | Good |
| Pocomoke River Swamp, Md. (over 7,000 ha.) | 202 | Quasi-Public & State | Cypress & Cedar Swamp | Partly Preserved |
| Poplar Island, Jefferson and Coaches Islands, Md. | 50 | Smithsonian Institution | Forest & Marshes | Good |
| Total | 3,078 | | | |

III. DEFINING THE NATURAL AREAS

To a slum-dweller a natural area could be a quarter-acre park; to an accomplished hiker, the term might not be served by anything less than a 1,000 square-mile primeval wilderness. As varied as the definitions of 'natural area' are the uses to which humans put such areas. For the purposes of this survey, a rather stringent definition was assumed, for the task was to identify natural areas with demonstrable, intrinsic ecological value.

Under such stringent definition, as we were well aware, many valuable features of the landscape are omitted from consideration. No definition of an ecosystem can escape the fact that an ecosystem is not a self-contained unit with definable limits. Plant life, for example, depends on a host of features--geological, climatic and so forth. And geologists may well find their most valued areas given short shrift in this survey. Archeologists and historians, as well as recreation planners, certainly will.

The definition of a natural area to be judged in this survey is: an area of land or water where natural ecosystem processes operate relatively undisturbed and where natural biological communities, their interactions, structures and functions can be studied. This is somewhat more restrictive a definition than that used by the "Catalog of Natural Areas in Maryland" published by that state's planning department. It is more precise, though not necessarily more to the point, than another definition of natural areas: "That which is His, not ours."

Altogether, using the ecological criteria outlined in this section, the survey identified 232 sites to be considered natural areas--a total potential land area of 138,319 hectares, or 4.2% of the entire study area.

The major types of natural areas of the Bay region are as follows:

a. Primeval Area. Areas which preserve examples of significant species of plants and animals. These wilderness areas should remain natural and unchanged by direct human influences, except in cases of successional communities which may require management to maintain them. They may have limited monitoring as remote "primitive" or "benchmark" areas.

b. Gene Pool Preserve. Special preserves for rare and endangered species of plants and animals requiring complete protection and, often, surrounding buffer zones.

c. Research Natural Area. Ecological research areas where natural processes are allowed to predominate and which are preserved primarily for research. Human use and collection is limited and non-destructive. They can also be used as "benchmark," "baseline," or "check" areas for monitoring environmental change.

d. Manipulative Research Area. Areas where research may modify an area to understand its function and permit better ecological prediction and management.

e. Educational Natural Area. Areas used to teach students and the public, and which may be used for minor research projects. Some development of human facilities and trails or access routes are usually needed.

The management of such natural areas would, as implied above, vary with the type, use and value of the area in question. The uses and values are several, and include:

Esthetic enjoyment. There is ultimately an esthetic value that urges the preservation of the best examples of the various types of plant and animal communities. Beyond that, one can say without being didactic that preserving such examples can only improve the national conscience and thus help prevent the mindless destruction of this part of our national heritage for future generations.

Baseline and long-term monitoring of environmental quality. Natural areas allow collection of essential baseline monitoring data to study trends and changes in populations, levels of pollutants and the effects of man's disturbance.

Study of the structure and function of natural ecosystems. Rational decisions on development and management of our environment depend on theoretical understanding of the natural environment. Integrated systems analysis and development of ecological models require detailed studies of natural areas to develop a predictive ecological capability.

Preservation of germ plasm reservoirs, gene pools, and endangered species. Natural areas preserve the genetic stock of organisms needed by man for new or improved strains of economic and survival value to society in agriculture, horticulture, silviculture, mariculture, medicine and other areas. Rapid

development and change of the world requires use of new strains of species with different adaptations. Threatened endangered species and natural communities once lost are gone forevermore.

Educational and training value. Natural areas are outdoor laboratories for complex research investigation as well as living museums where students and the public can observe nature first-hand. In some natural areas, manipulation of the environment is studied to show the impact of man's technology.

Contribution to environmental quality. Natural areas may act as ecological buffers to modulate the environment, helping in flood control, aquifer recharge and breeding areas for hunting, sport, and commercially important organisms. Natural areas maintain an environment which supports diversity and variety of individual choices.

When faced with the urgent need to make choices, one must choose with a combination of whatever scientific information and experiential judgment is available and thus decide what are the salient features to emphasize. The word 'value' has been used often in this report and it will be used many times again. The values of the Center for Natural Areas are, at the very least, implicit in what follows.

There is an enormous amount of accumulated information about the Chesapeake Bay Region--in scientific and popular literature, from unpublished sources such as knowledgeable biologists and conservationists, and from the biological collections of various

museums. It is altogether likely that some of this information is outdated, given the rapid rate of habitat modification taking place in the region, and ideally all this information should be rechecked, especially in the case of data about wetlands, coastal areas and islands.

At the same time, from the standpoint of making an ecological survey, there are great gaps in our knowledge. It is not always known, for example, what the correlation is between plant communities of various sorts and the niches of some animals, especially migratory ones. Nor is it always known what the tolerances of various plants and animals are to various changes in environmental quality. Faced with such gaps, the Center for Natural Areas was forced to rely on several traditional sets of parameters in classifying and ranking the natural areas of this vast region.

Important Biotic Communities

No natural ecosystem, even a simplified version such as a plant community, is discreet. All are bounded by gradients (ecotones) where the species characteristic of one habitat are gradually replaced by those of another. At its upper edge a salt marsh merges into a freshwater marsh which in turn passes without break into the forest on its edge. Only men make maps with lines on them, but such map lines—and categories—are necessary. The Chesapeake Bay region is rich in the categories of biotic

communities and, as distinctive communities, each type takes on an ecological value based on abundance, diversity, productivity, and other factors described later.

What follows is a brief taxonomy of the region's key ecosystems. The typical plants present in each ecosystem are mentioned, along with associated animals. Appendix B gives a more complete description of each ecosystem type, with more varieties of plants and animals, including the scientific nomenclature.

Salt Marsh or Brackish Tidal Marsh. This type of biotic community is flooded periodically, the period depending on the elevation of the marsh. The classic low marsh, flooded twice daily, is characterized by the ecologically important salt-marsh cordgrass, which serves as a base for many complex foodchains. The frequency of low marsh increases from north south in the Bay, particularly on the eastern shore. The flushing action of the tides is essential to the low marsh community, bringing in both fishes and nutrients and flushing out wastes. Tidal creeks meander through the salt marsh, rich in silt and organic debris from inland runoff, which provide additional nutrient supply.

High salt marsh is flooded only irregularly, and is composed of associations of grasses, rushes and sedges such as salt grass, saltmeadow cordgrass, black needlerush, glasswort, etc. Typical animals of both low and high salt marshes include: horseshoe, fiddler and marsh crabs; several species of snails, mussels and snakes; mallard, pintail and black ducks; sparrows, hawks and

herons; opossum, shrews, voles, rats, raccoons, and many other animals.

Freshwater Marsh. While freshwater marshes are more abundant toward the head of the Bay where the water is virtually fresh, they are also found upstream in almost every tributary stream in the Bay. A great diversity of plants is distributed in these marshes in response to variations in depth of water and salinity. The most important representative species include three-square, cattail, wild rice, common reed, and arrowhead. Also often occurring are varieties of rushes, sedges, and alder.

Corresponding with the high diversity of plant life, there is also a high diversity of animal life, including: salamanders, toads, many varieties of frogs, turtles, and snakes; herons, mallards, bald eagles, hawks and osprey; moles, beaver, muskrat and fox.

Bogs. Rather limited in size and distribution, bogs differ significantly from swamps and marshes. Bogs are so acid that biomass accumulates in their basins in the form of peat rather than decomposing and being recycled in the system as is more often the case in marshes and swamps. Bogs have a cushion-like surface layer of vegetation dominated by mosses. Also found is buckbean, cotton grass, numerous sedges, cranberry, and bog rosemary. A variety of unusual plants are found in bogs, including pitcher plant, baldderworts, orchids, sundews, and highbush blueberry. It is not unusual to find certain pine, maple and gum trees in and around bogs. The animal species of

bogs would generally be those of the surrounding ecosystems, such as quail, turkey, woodcock and warbler. One rare species found here would be the bog turtle.

Ponds. Both fresh- and saltwater ponds occur in the region. Salt ponds contain many of the species found in shallow marine habitats, but ditch grass is most characteristic. Freshwater ponds have a wide range of species: submerged aquatics such as tape grass, water milfoil, and bladderwort, and emergent species including arrowhead and pickerel weed.

Cypress-Gum Swamp Forest. The distribution of the Cypress-Gum Swamp Forest reaches its northern limits in the Chesapeake Bay region, where some of the species typical of the Bottomland Hardwood Forest give way in deeper water to the dominance of the baldcypress and the water tupelo. Typical animals include such birds as the double crested cormorant, the common egret, black crowned night heron, red shouldered hawk, barred owl, and pileated woodpecker. Such mammals as the gray fox, raccoon, mink, river otter, and even the black bear, bobcat and white-tailed deer also appear.

Bottomland Hardwood Forest. This community type is one of the most diverse terrestrial plant communities in the Atlantic Coastal Plain. It occupies the floodplains of the major rivers, and is often flooded in winter and spring with either lower water levels or no standing water in summer and fall. The vegetation is mostly trees with some shrubs and vines. The hardwoods in swamp

forests are black gum, red maple, tupelo, swamp poplar, various oaks, sweet gum, and sweet bay. The more mature bottomland forests may have beech, oaks and elms. In the smaller floodplains of the northern sections of the Bay, the dominant species are: beech, river birch, sycamore, box elder, and silver maple.

Animal species are also quite abundant in bottomland forests, due to the presence of a large supply of foods. Typical animals include: salamanders, toads, frogs, turtles, snakes, ducks, hawk, turkey, woodcock, woodpeckers, warblers, and cardinals. The list of mammals occurring here is much the same as those of the cypress-gum swamp forest, and should also include the opossum, eastern cottontail, squirrels, and beaver.

Pine Flatwoods. Loblolly and pitch pine dominate the coastal flatwoods, with loblolly pine particularly important in Virginia and pitch pine dominant in Maryland. The pine flatwoods are generally rather open with an incomplete canopy, and often have a diverse shrub and herb zone. These forests may be successional, and thus will eventually be naturally replaced by an upland hardwood forest. Some frequently found animals are the pine woods tree frog, fence lizard, cornsnake, hawks, quail, several woodpecker varieties, the pine warbler, pine woods sparrow, meadowlark, towhee, and pine mouse.

Upland Hardwood Forest. This is the climax forest of the upland parts of the region, and is dominated by various species of oak. Other mixed hardwoods including blackgum, hickories,

beech, sweetgum, magnolia and dogwood, are found in the uplands. Animals of the upland hardwood forest range from several species of salamander, skink and snake to the long-tailed weasel and the striped skunk. Birds typically found include hawks, owls, and woodpeckers, the ruby throated hummingbird, flycatchers, crows, jays, warblers, and vireos. Mammals commonly occurring are shrews, voles, mice, chipmunks, squirrels, raccoon, and deer.

Old Field Community. This is a very common community type which develops on abandoned lands, particularly agricultural lands. Many species of grasses, wildflowers, weeds, vines and briars are among the first to invade old fields. Next to arrive are plants like broomsedge, which can completely dominate the community within a few years. Not long after, sweetgum and pines begin to grow, and the old field can progress into a pine forest or eventually a hardwood forest. Common animal species found during the early stages of old field succession are savanna-, grasshopper- and field sparrows, and snakes and hawks which feed on the shrews, moles, voles, and mice which are so prevalent.

Dune Communities, Maritime Shrub Thickets, and Maritime Forests occur in the Chesapeake Bay region, but mostly on the Atlantic side of the DelMarVa peninsula and they are therefore not included in this study.

Rare and Endangered Animals

Many of our plant and animal species are being destroyed by man's developmental activities, by overgrazing, fire, introduced exotic species and diseases, and particularly destruction of habitats. Some of these species are of national significance, some are important as gene pools for food and fiber producers, as pharmaceuticals, or are of unknown potential use to humans. For many species, preservation of critical habitats as natural areas is sufficient to preserve the species from extinction. Other species require special laws to prevent hunting, picking or collecting.

At present, the species of endangered vertebrate animals are fairly well known. The enormous numbers of invertebrate animal species are less known and many have not even been described to science and have completely unknown status. (Certain species of endangered molluscs, butterflies, and a few other groups of invertebrates are presently fairly well known.) Most preservation efforts for endangered animal species are limited to the relatively small number of the larger and more obvious and interesting species. People tend to identify with vertebrates more than with invertebrates; they even choose them as symbols.

In the Chesapeake Bay region there are at least four species of vertebrate animals that are rare or endangered. This includes the southern bald eagle, the DelMarVa fox squirrel, the Maryland darter and the bog turtle. They are discussed below along with the osprey which is rapidly declining, but not yet in the endangered category.

The southern bald eagle (Haliaeetus leucocephalus leucocephalus) was once very abundant in the Chesapeake Bay region. In 1936 there were over 250 active nests throughout the Delaware, Virginia and Maryland areas. Today, around 90 nests, not all active in any given year, can be found in the same area. Not only have the number of nesting eagles declined but there has been a shift from the upper parts of rivers and the northern part of the Bay to the estuarine segments of the rivers and the southern bay. Despite pesticide-induced shell thinning (recorded for a number of birds of prey including fish predators such as the cormorant and brown pelican), the major cause of eagle mortality continues to be shooting, pollution of feeding areas, and loss of habitat to various forms of development). Even though the eagle population has declined by at least 60% in the last 10 years, the Chesapeake Bay region is the most productive area north of Florida for southern subspecies of bald eagle. The prognosis is not good, however, since the reproductive rate, 5-35%, is considerably below that necessary for a stable population.

The DelMarVa fox squirrel, also known as the Bryant fox squirrel (Sciurus niger cinereus), is a subspecies of the more widespread eastern fox squirrel. Never very abundant or widespread in its range, the DelMarVa fox squirrel is confined today to four eastern shore counties in Maryland: Kent, Queen Anne, Talbot, and Dorchester. The population apparently lies somewhere between 500 and 1500 individuals. Although protected in Maryland since 1971, this species is easily confused with the more abundant eastern gray squirrel Sciurus

carolinensis and many are probably killed during the hunting season. Continued reduction of habitat by real estate developments and cutting of the old-aged, mixed pine-hardwood stands which are the prime habitat, have doubtless contributed to population decline as well.

The Maryland darter (Etheostoma sellare) is a small and rather nondescript fish found in only two streams, Deer Creek and the east branch of Swan Creek, both tributaries of the Susquehanna in Harford County, Maryland. While the population size is unknown, it is assumed because of the very limited habitat to be rather small. Since the species appears to be endemic at the periphery of the range of its closest relatives, it has not been abundant for rather a long time.

The bog turtle (Clemmys muhlenbergi) as its name suggests, is limited to wetland areas in the northeast and the southern Appalachians. Because of its rather secretive behavior its numbers are difficult to determine. Its decline can be inferred both from the destruction of its rather limited habitat and the high value placed on it by pet shops because of its scarcity. It has been protected in Maryland, the only state in the Bay region where it occurs, since 1972.

The osprey (Pandion haliaetus) is not an endangered species, but populations are declining in many places along the east coast -- an example of a rare, declining, or depleted species. Annual production to guarantee replacement for a stable population has been estimated at between 0.95 and 1.30 young fledged per breeding female. In only a few parts of the Bay is this figure reached every year. Despite

the decline, the Bay region has the highest concentration of nesting osprey in the United States -- roughly estimated at 1400 pairs in 1972 and 1100 in 1973. Reasons for the decline, where observed, seem similar to those responsible for the southern bald eagle decline.

The abundance and distribution of most invertebrate animal species is in general poorly known except for certain pests or commercially important species. The Washington, D. C. area has been the site of extensive biological study so that many type localities exist where species have been described. For many species, this is the only known information as the species may never have been collected again. It is important to determine the rarity or endangered status of these species with specialized field studies.

Two species of rare and endangered crustacea are known from the Chesapeake Bay region:

Hay's Spring scud (Stygonectes hayi) is a blind white crustacean known only from a single spring in Washington, D. C. and threatened by urbanization and groundwater pollution. Once widespread, it is now greatly restricted in habitat and has been extensively looked for in recent years.

The Tidewater scud (Stygonectes indentatus), a unique interstitial crustacean, is limited to several groundwater seeps in Nansemond County, Virginia, and is threatened by groundwater pollution throughout its range and by suburban sprawl. It is a primitive member of the genus and is believed to live in the ancestral habitat that once was

characteristic of the genus. It has been sought but not found elsewhere in the tidewater area.

Rare and Endangered Plants

The rare and endangered plants of the Chesapeake Bay region had never been compiled before this survey and no list existed. Plant distribution and abundance is much less known (except for certain trees) than for vertebrate animals. Many plant records are from old records in herbaria, often with vague locality data, and the plant species may no longer exist.

Major disruption of habitats due to agriculture, lumbering, and introduction of exotic weeds has resulted in enormous changes, driving many species close to extinction.

An extensive survey of the literature, consulting with specialists, and examination of herbaria (U. S. National Museum of Natural History, Harvard Gray Herbarium, Clyde Reed Herbarium) resulted in a preliminary list of 23 species of plants which are reported to be rare and endemic. Of these, about 15 species may be considered endangered. The total population of the local and endemic seaside alder (Alnus maritima) occurs in only four counties in the Bay area, but it is not endangered or threatened.

Much more field work and collecting is necessary to validate the exact present status of each species of rare and restricted plant. Extensive field work is required to prove whether or not certain plant species have become extinct.

Range Phenomena

Plant and animal species usually have distinct areas where the major populations occur. But at the edges of the range there may be outliers or disjunct populations which may have developed taxonomic or other differences if they have been isolated for some time. They may include both new endemic or old relict populations of scientific importance and often need protection. At the edges of ranges, species may be rare and require protection.

Because of its position halfway up the Atlantic Coastal Plain, the Bay region includes many edges of ranges or outlying disjunct populations.

Northern Limit. Many species with an essentially southern distribution extend into the Bay region; e.g., longleaf pine (Pinus palustris) and water tupelo (Nyssa aquatica).

Northern Outlier. Some southern species have disjunct populations, often just a few individuals, well north of the contiguous populations: e.g., bald cypress (Taxodium distichum), water hickory (Carya aquatica), overcup oak (Quercus lyrata), and live oak (Quercus virginiana).

Southern Limit. Essentially northern species whose southernmost distribution extends into the Bay region: e.g., black ash (Fraxinus nigra).

Southern Outlier. Populations in the Bay region that are disjunct from the southern continuous populations to the north: e.g., balsam poplar (Populus balsamifera).

Eastern Outlier. Species whose distribution is primarily midwestern extend eastward as disjunct outliers: e.g. chinkapin oak (Quercus muehlenbergii), shumard oak (Quercus shumardi), and bur oak (Quercus macrocarpa).

Coastal Plain Outlier. Upland species characteristic of the Appalachians are occasionally found in small colonies deep in the coastal plain over a hundred miles from the nearest upland population; e.g., white pine (Pinus strobus), hemlock (Tsuga canadensis), and rhododendron (Rhododendron maximum).

Regardless of their nature, these populations are of far greater importance than as mere geographical curiosities. Any organisms living on the edge of its range is operating at the limit of its adaptation to its environment as well, and it may be particularly sensitive to environmental stresses with which it can cope in the center of the range. If we are to understand the ecological amplitude of any species, it must be studied under extreme conditions as well as optimal ones. For this reason, a few acres of scraggly hemlocks on the eastern shore may be worth a hundred acres on the Blue Ridge. These range phenomena have been located as precisely

as records allow, and they enter importantly into the natural area selection process.

Various species are restricted or endemic to the region and are of particular ecological significance. Most of these endemic species are rare and endangered. Some endemic species such as seaside alder (Alnus maritima) are restricted and local, but not yet in the category of endangered or threatened. If these species are locally exterminated, it will result in the worldwide loss of the species.

Seasonal Concentration of Animals

While endangered, rare, and uncommon species are critically important and figure strongly in the selection of desirable natural areas, the most striking feature of Bay wildlife is the seasonal concentration of various species. There are three major groups: overwintering species, seasonal breeders, and migratory stopovers.

Overwintering Species. Many Bay area residents, hunters or not, eagerly look forward to the October arrival of noisy skeins of geese and ducks followed later by whistling swans. By April, the old-squaw, canvasback, mergansers, Canada geese, and swans have returned to their northern breeding places, but their economic and ecologic impact is considerable. Unlike the endangered species which tend to stay put, overwintering species frequently move about on their overwintering grounds and have even adapted new habits as old food supplies disappear and new ones appear.

The swan, Cygnus columbianus, which as recently as a few years ago fed offshore in shallow water while the less wary geese flew inland to feed on stubble fields, have now begun to emulate the habits of geese and can be seen in flocks of several hundred on fields far from open water. This may be due in part to a decrease in the supply of food offshore resulting from increased turbidity and pollution. Nevertheless, it is difficult to anticipate in which bay or river the overwintering species will concentrate from year to year.

Setting aside natural areas to accommodate overwintering species is not practical unless the areas are specifically managed for waterfowl, and such management may then interfere with other uses or values of a given area. Even so, unusual concentrations of overwintering waterfowl have been noted and considered as a criterion for natural areas selection.

Seasonal Breeders. Various species of animals concentrate in certain areas to reproduce. This is particularly true of many migratory species of birds and fish and for some mammals and amphibia. Birds nesting in certain areas, e.g., heronries and sea bird nesting sites, may result in very high seasonal populations. Spawning fish, especially anadromous species, concentrate in selected areas during reproduction periods. In Chesapeake Bay, striped bass (Morone saxatilis), herring (Alosa aestivalis), hickory shad (Alosa mediocris), white shad and American shad (Alosa sapidissima) ascend freshwater streams to breed, many in

large enough quantities to be of commercial value. The striped bass is of course a highly regarded sport fish as well. The importance of small tributary streams as breeding areas and their attendant marshes as nurseries for the subsequent fry has been considered in assessing natural area value.

Wood duck nesting concentrations have been noted (in the study's computer print-out) where information was available. This species, considered endangered 30-40 years ago, has made an astonishing come-back. The wood duck (Aix sponsa) declined as the old trees which had proper nesting cavities were logged off and younger trees cut before reaching proper size. Artificial nesting sites have helped the wood duck to become relatively common again. Since the male is one of the most beautifully marked birds in North America, nesting data was included in the natural areas evaluations.

Heronries are present in the Bay region, mostly of the great blue heron (Ardea herodias) but other types of heronries are found too -- green heron (Butorides virescens), black-crowned night heron (Nyctocorax nycticorax), and American egret (Casmerodius albus). At the present about 30 active heronries have been plotted on Map 2, although others probably exist.

Migratory stopovers. Certain areas such as peninsulas and islands are utilized by shorebirds, birds of prey, and passerines passing north or south during migrations. The birds pause to feed and rest for a few days before resuming their migratory flights.

Whenever possible, such areas were located and considered in selecting natural areas.

Commercial Game and Unusual Animal Populations

It is important to provide protected areas for wild game, fish, and shellfish where the populations are protected from over-exploitation. These areas should include breeding areas where populations can build up in sufficient numbers to supply the populations required for commercial or sport hunting and fishing. Game refuges and wildlife management areas are examples of this concept. However, a wider distribution of more areas with different habitats will insure larger and more widespread populations than the relatively few larger wildlife refuges. This is particularly important for certain non-game species.

These protected natural areas are necessary for preservation of many fur bearing animals of interest such as otter, beaver, mink, bobcat, bear, fox and other animals which most humans are happy to occasionally observe in the wild and to know that they still exist. These animals plus deer are rarely seen by the average person.

The high point of many vacationers is to have observed some of these animals in the wild. Preservation of natural areas assures more abundant populations of these animals. A natural area next to a park or recreation area enhances the park greatly.

Clam and oyster beds are quite intimately related to both the bay or estuary where they are located and the nearby marshes which provide the production which the shellfish, in part, harvest. Shellfish are sessile as adults and are quite sensitive to siltation. Some species such as oysters (Crassostrea virginica) lack the siphon that permits clams to be buried by silt. Clams are also dependent on detritus from marshes for food, especially in the younger stages. Adult crabs (Callinectes sapidus) may feed in turn on smaller detritus feeders. Although crabs are quite mobile and migrate during the winter into deeper water near the mouth of the Bay, their attraction to certain areas in the summer reflects the high productivity of those areas. These places should be identified wherever possible as well as oyster bars and clam beds.

Paleontological Features

Fossils, mostly of Miocene age (25,000,000 years before present), are abundant in many exposed Bay front areas: Calvert Cliffs is probably the best known example. The nature of the material (snail shells, shark teeth, whale bones) and its age give glimpses into the past continuum of environments leading to the present. More than any other geological feature, fossils bring home to the general public the meaning of geological time. Fossil sites were given consideration in this survey, but they generally included few ecologically valuable features and received low ratings.

Strictly geological features and archeological sites were not included in this study. In any expansion or subsequent refinement, they should ideally be included.

Well-Documented Sites

An area that has been the subject of continuing scientific research, is of great value for it is possible to use the background of data to help predict the future and to deepen our understanding of the local environment. Such areas were given high consideration in the selection of natural areas.

Plummers Island in the Potomac River above Washington, D. C. is the site of many biological surveys and censuses and is the type locality site for many species of plants and animals. Areas of this type with many years of records and numerous publications should be preserved with a high priority.

Exceptional Individuals or Associations

Records are often kept for the largest individual of a species, such as the Wye Oak, located in the eastern shore area of Maryland, which is the largest white oak known. While of limited scientific value, these largest and oldest individuals are of interest to the public.

The presence of a virgin (or late successional) stand of almost any species of tree is of interest in the eastern United States and should be preserved with a high priority.

Associations of species rarely found together are also of interest, such as northern mountain species occurring together with southern lowland species. This often indicates relict conditions such as hemlock and rhododendron isolates and northern species left in sphagnum bogs adjacent to southern communities of plants.

Size of Area

The bigger an area, the greater its diversity of ecosystems, communities and species is likely to be. In smaller isolated areas the larger predators which act as regulators are usually missing and may require intervention by man to prevent too large populations of primary herbivores.

The minimum size required for a natural area has been discussed almost endlessly and to halt repetitive debate certain arbitrary sizes have been set. The prime function of size as a criteria lies in the viability of the ecosystem to be protected. This varies greatly depending on the ecosystem. A tenth acre bog may be quite defensible with some protecting buffer zone. A small area of mountain top or a small island can be preserved and maintained with relative ease. In addition, a half acre plot of rare tall-grass prairie in a cemetery or along a railroad should be preserved as a natural area.

On the other hand, pine flatland may require over 1,000 acres to provide examples of the usual species expected in such an area. There is no rule for determining the minimum size of an

area to be protected, but 'the larger the better' is the usual rule as long as the natural area contains ecologically important and significant biota and functions.

Some natural areas may require a buffer area to prevent contamination, silting, or protection from other human interferences. Buffer zones may themselves be true natural areas or areas with conservation easements to prevent destruction or exploitation, hunting and/or fishing, or otherwise to assure the protected area's viability.

IV. RANKING THE AREAS

On Methods

For this survey ecological and other data for the region were compiled from all available sources including scientific publications, popular literature, and from individuals and organizations. A questionnaire entitled "Chesapeake Bay Natural Areas Survey" was sent to several individuals to ascertain its effectiveness but it was found that direct contacts and other sources were more effective: the questionnaire was not extensively used. A questionnaire on rare and endangered species, however, was very productive.

The data for the region and each proposed site were entered onto maps and a data retrieval system was set up to handle non-graphic data. Eventually these data were organized in the format of the National Registry of Natural Areas and entered into its computer file. In the early part of the survey, time limitations and the need for portability of the information suggested a simpler, interim solution. Data cards (Burroughs Y-0 Unisort) conducive to a punch-hole sorting technique were typed for each natural area. The system can handle 22 blocks of ten bits each or 220 items per card. Desired information can be located in the master key describing the block information, a rod run through the proper hole, and the cards punched for that hole fall loose and deliver the data. The major advantages of the system are the portability of the entire deck, the elimination of alphabetization and cross

indexing, and the ability, with a modest amount of hand sorting, to group and regroup the data in any desired way. The information from the data cards was used to develop the computer registry.

A geographic inventory approach was developed so that each element of data would be mapped at a common scale on a standard base map of the entire Chesapeake Bay study area. Since there was no existing map of the entire region sufficiently detailed to portray area information such as wetlands or other important natural areas, a base map was made using a mosaic of the seven 1:250,000 scale U. S. Geological Survey topographic maps of the area.

Data were mapped on transparent overlays to allow for manipulation and analysis, and on topographic map base sheets that could be inexpensively reproduced as solid prints. Several reproducible mylar base sheets were prepared, each containing a photographic copy of the map mosaic and displaying the standard information such as cities and towns, roads, topography, and water features.

Because of the need for more detailed mapping of specific sites and natural phenomena, it was necessary to prepare a set of 1:24,000 scale (7 1/2 minute) USGS topographic quadrangle maps covering the study area represented on the 1:250,000 scale maps. A complete set of 281 topographic maps was assembled and keyed to the larger study area map by numerical index.

The 1:250,000 maps and overlay techniques visually showed the ecologically important and significant features of the area, and areas required for their preservation.

The Numerical Ranking System

To set priorities among 232 diverse areas calls for a numerical ranking system whereby one can weight selected criteria that delineate ecological and, in some instances, social values. Some criteria require not only detailed knowledge of the sites in question but also a broad knowledge of the range and rarity of plant and animal species.

In other words, numerical values were assigned each criterion based on ecological judgment. Modifications were made in the course of the project and testing and further improvements of the system are needed. The weighting system gives greater importance to plant communities or types that are not in the National System of Research Natural Areas, those for which there are already many examples. Also, the factors of diversity, quality, lack of past and present disturbance, protectability, and other factors have been given appropriate weighting.

Subjective evaluation could be added to take into account species with human emotional or national significance. The condor, whooping crane or bald eagle have higher importance for preservation than a subspecies of sedge which can be identified by only a few specialists.

Several other ecological ranking systems have tried to take into account the factors of man-induced pressures on the land and relative isolation from development. Indeed, one of the original rankings used in this study gave added weight to threatened areas. This seems to make sense for any setting of priorities as far as timing is concerned. But as far as true ecological value is the measure, isolation from threatened destruction should receive greater numerical value. If both of these factors are included in one system, they tend to cancel each other out. For these reasons we have excluded the factors of threat and isolation. In the implementation of preservation actions, however, the ecologically important areas that are threatened most should of course be worked on first.

Selection of Proposed Natural Areas. In making the quantitative evaluation of each site considered as a natural area, all of the data in the file for each site were put into a standardized format for natural areas. This is the system jointly developed for the Natural Area Registry by The Nature Conservancy and the Smithsonian Center for Natural Areas. It is compatible with the system used by the U. S. Committee on Conservation of Ecosystems of the International Biological Program. The data for the considered sites for the Chesapeake Bay are shown in the complete print-outs. They also contain the present rating for each site (also shown in the lists in this report). The ratings are not permanent and can be updated with the addition of further ecological information.

Some areas, of course, have extensive information, perhaps including records of species no longer present, and other areas have very little data but are still of great value. Therefore, the system is designed to be highly flexible with regular updating and change of ratings possible. For this reason, no data on sites with low ratings are destroyed since data may accumulate to increase the ratings. Also, areas with high ratings may be lowered with loss or destruction of ecological features.

Several versions of the ranking system were tried out in this survey. One of the early systems used gave equal weighting to each of the criteria but it was only partially successful in establishing what the project staff judged to be valid priorities. With the acquisition of more detailed data from each area a reevaluation was required and the present evaluation system was used. [SEE TABLE 4]

A separate but related procedure in the rating process was the use of mapping techniques. When all of the ecologically significant data on plants, animals, unique communities and habitats, wetlands and other features have been mapped and printed on transparent overlays, the data are then visually available. A base map of the areas presently protected, transparent ecological data overlays, and an overlay of the proposed natural area sites permit visual evaluation of the value of each proposed site and shows the need for additional specific natural area sites to protect concentrations of important fauna, flora, and ecosystems. Overlays

show the ranges of certain species, help in specifying critical sites for preservation, and are of great value in evaluating how effective the list of existing and proposed sites are in preserving the ecological features. Those sites with many valuable ecological features can then become the target of high priority field studies, as a prelude to procurement.

There were 232 areas considered, and rated, using the criteria and numerical weighting system in Table 4 and overlay maps 3 and 4. The highest rating was 24 and the lowest was 1. There were 57 areas with a rating of over 10. These have been selected for highest priority proposed primary natural areas. The rest are recommended for secondary consideration except for 7 areas recommended for special consideration. These include areas with 10 or less points but are essential to provide examples of outlier hemlock, bogs, or other special categories. Thus there are 64 areas which should be given primary consideration for procurement. This system gives a premium to diversity and the greater the variety of natural features and biota, the higher priority is the area. However, ecological judgment is required in making the final recommendations based on the number of ecosystem types represented and any special categories that must be considered. Since the data have been computerized, it is possible for a procurement agency to selectively determine priorities using selected categories. For example, if it is desired to select the areas with virgin or mature hardwoods, or

areas containing eagle nests, these can now be selected readily.

The 64 natural areas of prime ecological importance are listed below in Table 5 in order of numerical ranking. These and the remaining 168 areas are indexed by state and county on Page and by alphabetical order on Page , for ease in cross-referencing. The remaining areas under consideration which appear in Table 6 all received lower rankings using this particular system. They should not, however, be neglected because they could easily score much higher with different weightings or with the inclusion of other factors in the rating system.

The 64 prime natural areas represent roughly 28% of the original 232 areas considered and ranked. In area, the sixty-four sites include about 236 square miles. Thus we are recommending procurement or other preservation action for roughly 2% of the land in the Chesapeake Bay region study area. The Center for Natural Areas is already evaluating some of these areas as part of the Atlantic Coastal Plain Natural Landmark Survey, under contract with the National Park Service, Department of the Interior.

NOTE: This survey should not be considered final or complete. Some prime natural areas may have been inadvertently missed which should have been included. The Center for Natural Areas welcomes any and all additional ecological information to improve its knowledge of the Bay region.

TABLE 4. CRITERIA AND QUANTITATIVE VALUES
FOR SELECTION OF NATURAL AREAS

| | | <u>Points</u> |
|--|-----------------|------------------|
| 1. Ecosystem Types | | |
| Diversity of ecosystem types | | 1 (each) |
| Little or no past and present disturbance | | 2 |
| High diversity of species | | 2 |
| Type not represented in National Research Natural Area System | | 4 |
| 2. Endangered, or Threatened Biota and Gene Pool Species | | |
| Endangered and threatened plant or animal species | | 4 (each sp.) |
| Rare, declining, or depleted species | | 2 (each sp.) |
| 3. Range Phenomena | | |
| Outliers, disjuncts, or relict species | | 1 |
| Limits of range—N, S, E, W | | 1 |
| Restricted and endemic species | | 1 |
| 4. Seasonal Concentrations of Animals | | |
| Seasonal breeders - nesting, spawning | | 1 |
| Overwintering concentrations | | 1 |
| Migratory concentrations | | 1 |
| 5. Commercial, Game, or Unusual Animal Populations | | |
| Ungulates, game birds, fur bearers | | 1 |
| Fish, clams, oysters, crabs | | 1 |
| 6. Paleontological, Geological and Archeological Features | | |
| Bones and artifacts, deposits of fossils, peat, lignite, sediments, structural and geomorphological features | | 1 (each feature) |
| 7. Sites of well documented scientific research or discovery and records over period of years | | 1 |
| 8. Oldest, largest, or otherwise exceptional individuals or associations | | 1 (each) |
| 9. Size of area | | |
| <u>Acres</u> | <u>Hectares</u> | |
| Under 100 acres | Under 45 | 1 |
| 100 - 1,000 | 45 - 457 | 2 |
| 1,000 - 5,000 | 457 - 2,270 | 3 |
| over 5,000 | over 2,270 | 4 |

Example of the Rating System in Use. Below is an illustration of the rating system as applied to Zekiah Swamp, the first-ranked area. The natural features of the site are listed or summarized on the left. On the right are the numerical values which apply to those features, according to the scheme in Table 4 on the previous page.

| <u>Data</u> | <u>Points Awarded</u> |
|--|-----------------------|
| Zekiah Swamp | |
| Maryland | |
| Charles County | |
| 5,385 hectares in size | 4 |
| Private ownership | |
| Hardwood swamp forest | 1 |
| Good stands of <u>Ilex opaca</u> , <u>Quercus palustris</u> , and <u>Liquidambar styraciflua</u> . Mature Timber. | |
| High diversity of plant species. | 2 |
| <u>Populaous heterophylla</u> , southern outlier | 1 |
| Beaver, mink (commercial species) | 1 |
| Osprey (depleted), heronry (seasonal breeders) | 3 |
| Wilson's snipe and wood duck (overwintering) | 1 |
| Concentration of migrating birds | 1 |
| Southern Bald Eagle nest (endangered) | 4 |
| Rare animals: red bellied woodpecker, Maryland Diamondback Terrapin, <u>Allocapania</u> Zekiah Stonefly | 4 |
| One of the largest of Maryland's remaining undisturbed swamps | 2 |
| | <hr/> |
| Rating Total | 24 |

V. MASTER LIST OF NATURAL AREAS

The following eighty-six color pages consist of a computer print-out of key information on all 232 areas considered in this survey, listed in order of ecological importance. There is of course no hard-and-fast necessity for the particular placement of each area in the list, especially for the areas which received equal numerical ratings. Therefore the reader should view this list with a certain fluidity, remembering that the ranks may change with improvement in data or insight. The list is separated on page 73, with primary areas recommended for preservation above and secondary areas recommended for consideration below. Note that some areas in the secondary section deserve special attention and should therefore be considered for preservation with the primary group. These seven areas are:

Helen Creek Hemlock Preserve; Calvert Co., Maryland; p73
Chisel Run Bog; James City Co., Virginia; p74
King Creek - Kingston Landing; Talbot Co., Maryland; p76
Blinkhorn Creek; Dorchester Co., Maryland; pp87 & 88
Round Bay Bog; Anne Arundel Co., Maryland; p91
Andover Branch; Queen Anne Co., Maryland; p101
Hemlock Stand on Mill Creek; Caroline Co., Maryland; p102

When searching for areas with high priority, consult the first part of the master list. When searching for areas within a particular county, consult the Index on page 119. Areas themselves can be found in the Alphabetical Index on page 130. To find the map location of an area, consult the U.S. Geological Survey 7.5 minute series topographic maps named under "Quadrangle" in the master list.

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

PAGE NO:

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|------------------------------|---|----------------------|
| 00000674 | 010 | 01 | NAME OF AREA: | ZEKIAH SWAMP |
| 020 | 01 | STATE: | MARYLAND | |
| 021 | 01 | COUNTY: | CHARLES | |
| 030 | 01 | QUADRANGLE: | HUGHESVILLE, MD; POPES CREEK, MD; LA PLATA, MD | |
| 040 | 01 | SIZE OF AREA: | 05385.3 HA | |
| 060 | 01 | OWNER 1: | PRIVATE | |
| 151 | 01 | AQUATIC TYPES: | SWAMP | |
| 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, BEAVER, MINK, OSPREY, OVERWINTERING WILSON'S SNIPES AND WOOD DUCK, HERONRY, GOOD STANDS OF ILEX OPACA, QUERCUS PALUSTRIS AND LIQUIDAMBAR STYRACIFLUA, VIRGIN TIMBER, MANY BIRD AND PLANT SPECIES, SORA RAIL CONCENTRATION OF MIGRATING BIRDS, MARYLAND DIAMONDBACK TERRAPIN, POPULUS HETEROPHYLLA, DISJUNCT POPULATION, SOUTHERN OUTLIER, POTAMOGETON PULCHER, IN POTOMAC RIVER WATERSHED, ONE OF THE LARGEST NATURAL SWAMPS REMAINING IN MARYLAND | |
| 180 | 01 | DESCRIPTION OF AREA: | EAGLE NEST; RED BELLIED WOOD PECKER; ALLOCAPANIA | |
| 191 | 01 | RARE AND ENDANGERED ANIMALS: | ZEKIAH STONEFLY; | |
| 200 | 01 | CONTENTS IN MANUAL FILE: | TOPOGRAPHIC MAP; SOILS MAP; GENERAL INFORMATION; PUBLICATION | |
| 301 | 01 | AUTHOR: | TAYLOR, JOHN W | |
| 303 | 01 | TITLE: | THE WICOMICO RIVER | |
| 304 | 01 | JOURNAL:VOLUME:PAGES: | ATLANTIC NAT. 9(3):133-138 | |
| 400 | 01 | AREA INCL. BUFFER ZONE: | 07320.5 HA | |
| 410 | 01 | ECOLOGICAL RATING: | 24 | |
| 00000608 | 010 | 01 | NAME OF AREA: | DRAGON RUN |
| 020 | 01 | STATE: | VIRGINIA | |
| 021 | 01 | COUNTY: | KING AND QUEEN; MIDDLESEX; GLOUCESTER; ESSEX | |
| 030 | 01 | QUADRANGLE: | CHURCH VIEW, VA; SALUDA, VA; SHACKLEFORDS, VA | |
| 040 | 01 | SIZE OF AREA: | 02735.1 HA | |
| 060 | 01 | OWNER 1: | PRIVATE | |
| 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, TAXODIUM DISTICHUM, CHAMAECYPARIS THYOIDES AND PINUS SP, OSPREY, BEAVER MINK, TURKEY AND OTTER, ANADROMOUS FISH, OVERWINTERING CANADA GEESE, HERONRY, TILLANDSIA USNEOIDES REACHES NORTHERN LIMIT AT THIS LOCATION, FOSSIL SHELLS, ST. MARY'S FORMATION, TIMBER OPERATIONS, AREA STUDIED BY VIRGINIA OUTDOOR PLAN AS A SCENIC RIVER, PRIME WETLAND. | |
| 180 | 01 | DESCRIPTION OF AREA: | EAGLE | |
| 191 | 01 | RARE AND ENDANGERED ANIMALS: | TOPOGRAPHIC MAP | |
| 200 | 01 | CONTENTS IN MANUAL FILE: | 22 | |
| 410 | 01 | ECOLOGICAL RATING: | | |
| 00000610 | 010 | 01 | NAME OF AREA: | POCOMOKE RIVER SWAMP |
| 020 | 01 | STATE: | MARYLAND | |
| 021 | 01 | COUNTY: | WORCESTER; WICOMICO; SOMERSET | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

PAGE NO:

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|--|
| 00000610 | 030 | 01 | QUADRANGLE: | PUBLIC LANDING, MD; SNOW HILL, MD; GIRDLETREE, MD; |
| | 02 | | | POCOMOKE CITY, MD; KINGSTON, MD |
| | 040 | 01 | SIZE OF AREA: | 05841.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, TAXODIUM DISTICHUM, PINUS SP., |
| | | 02 | | CHAMAECYPARIS THYOIDES, MAGNOLIA SP., ILEX AND TILLANDSIA |
| | | 03 | | USNEOIDES, SWAINSONS WARBLER, SHELLFISH, ANADROMOUS FISH, |
| | | 04 | | WOOD DUCK BREEDING, DEER, TWO EAGLE NESTS. |
| | 180 | 01 | DESCRIPTION OF AREA: | INCREASING RESIDENTIAL AND OTHER DEVELOPMENT OF SHORELINE. |
| | | 02 | | ANGER OF WATER POLLUTION. PRIME WETLANDS. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | ALNUS MARITIMA |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NESTS |
| | 410 | 01 | ECOLOGICAL RATING: | 22 |
| 00000601 | 010 | 01 | NAME OF AREA: | CHICKAHOMINY, LOWER - PROVIDENCE FORGE |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHARLES CITY; JAMES CITY; NEW KENT |
| | 030 | 01 | QUADRANGLE: | FORGE, VA; BRANDON, VA; WALKERS, VA; PROVIDENCE, VA |
| | 040 | 01 | SIZE OF AREA: | 02189.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. TAXODIUM DISTICHUM. |
| | | 02 | | OSPREY, ANADROMOUS FISH, HERONRY. |
| | 180 | 01 | DESCRIPTION OF AREA: | BROAD EXTENSIVE FINE MARSHES AND TAXODIUM DISTICHUM |
| | | 02 | | STANDS FLANKED IN PLACES BY CLIFFS UP TO 33 M HIGH. |
| | | 03 | | IN JAMES RIVER WATERSHED. SOME OF BEST MARSHES IN |
| | | 04 | | VIRGINIA. PRIME WETLAND. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | BACOPA STRAGULA; BACOPA SIMULANS |
| | 410 | 01 | ECOLOGICAL RATING: | 19 |
| 00000603 | 010 | 01 | NAME OF AREA: | CHICKAHOMINY, MIDDLE |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEW KENT; CHARLES CITY; HENRICO |
| | 030 | 01 | QUADRANGLE: | QUINTON, VA; ROXBURY, VA; PROVIDENCE, VA; FORGE, |
| | | 02 | | VA; SEVEN PINES, VA |
| | 040 | 01 | SIZE OF AREA: | 03959.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | RIVER |
| | 170 | 01 | BIOTIC COMPONENTS: | ANADROMOUS FISH, HERRING, SWAMP FOREST. HARDWOODS AND |
| | | 02 | | TAXODIUM DISTICHUM. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. PRIME WETLAND. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | JUNCUS CAESARIENSIS. HELONIAS BULLATA. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | OSPREY |
| | 410 | 01 | ECOLOGICAL RATING: | 18 |
| 00000607 | 010 | 01 | NAME OF AREA: | MATTAPONI RIVER, LOWER |
| | 020 | 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

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|----------|-----|----|------------------------------|---|-----------------------------------|
| 00000607 | 021 | 01 | COUNTY: | KING AND QUEEN; | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | WEST POINT, VA; | TRUHART, VA; KING AND QUEEN COURT |
| | 040 | 02 | SIZE OF AREA: | HOUSE, VA; KING WILLIAM, VA; | AYLETT, VA |
| | 060 | 01 | OWNER I: | 01903.0 HA | |
| | 151 | 01 | AQUATIC TYPES: | PRIVATE | |
| | 170 | 01 | BIOTIC COMPONENTS: | MARSH, FRESHWATER; | RIVER; MARSH, TIDAL |
| | | 02 | | MAJOR MARSHES FOR ANADROMOUS FISH, STRIPED BASS, | |
| | | 03 | | HERRING. HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES | |
| | | 03 | | PRESENT. | |
| | 180 | 01 | DESCRIPTION OF AREA: | IN MATTAPONI AND YORK RIVERS WATERSHED. SOME OF THE | |
| 00000609 | 190 | 01 | RARE AND ENDANGERED PLANTS: | FINEST MARSHES IN TIDEWATER VIRGINIA. | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | BACOPA STRAGULA; CASSIA FASCICULATA VAR. MACROSPERMA | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | EAGLE NEST | |
| | 410 | 01 | ECOLOGICAL RATING: | 05223.7 HA | |
| | | 01 | | 18 | |
| | 010 | 01 | NAME OF AREA: | PATUXENT RIVER | |
| | 020 | 01 | STATE: | MARYLAND | |
| | 021 | 01 | COUNTY: | CALVERT; | PRINCE GEORGES; ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | LOWER MARLBORO, MD; | BRISTOL, MD; BENEDICT, MD |
| | 040 | 01 | SIZE OF AREA: | 04597.5 HA | |
| 00000655 | 060 | 01 | OWNER I: | PRIVATE | |
| | 170 | 01 | BIOTIC COMPONENTS: | EAGLE, OTTER, MINK, KING RAIL. HERONRY. WOOD DUCK. | |
| | | 02 | | TEAL. ANADROMOUS FISH, SHAD, HERRING, STRIPED BASS. | |
| | | 03 | | PLANT SPECIES INCLUDE TYPHA SP., ORONTIUM AQUATICUM, | |
| | | 04 | | PONTERERIA SP., HIBISCUS PALUSTRIS AND SPARTINA SP. | |
| | | 05 | | SORA RAIL CONCENTRATED IN FULL MIGRATION. | |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLAND. | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST | |
| | 410 | 01 | ECOLOGICAL RATING: | 17 | |
| | | 01 | | | |
| 00000665 | 010 | 01 | NAME OF AREA: | CEDARS, THE - CHURCH CREEK - RINGGOLD POINT | |
| | 020 | 01 | STATE: | MARYLAND | |
| | 021 | 01 | COUNTY: | KENT | |
| | 030 | 01 | QUADRANGLE: | LANGFORD CREEK, MD | |
| | 040 | 01 | SIZE OF AREA: | 00395.9 HA | |
| | 060 | 01 | OWNER I: | PRIVATE | |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; MARSH, FRESHWATER | |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH AND FRESHWATER MARSH VEGETATION WITH TYPHA SP. | |
| | | 02 | | UPLAND MATURE HARDWOODS. OSPREY, OTTER, WOOD DUCK, CRAB AND | |
| | | 03 | | OYSTERS. ANADROMOUS FISH, STRIPED BASS. WHISTLING SWAN, | |
| 00000686 | | 04 | | WINTERING. | |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED. | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST | |
| | 410 | 01 | ECOLOGICAL RATING: | 17 | |
| | | 01 | | | |
| | 010 | 01 | NAME OF AREA: | MILES CREEK | |
| | 020 | 01 | STATE: | MARYLAND | |
| | | | | | |
| | | | | | |
| | | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000686 | 021 | 01 | COUNTY: | TALBOT |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD; TRAPPE, MD |
| | 040 | 01 | SIZE OF AREA: | 00492.9 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. DELMARVA FOX SQUIRREL, |
| | | 02 | | OSPREY, OTTER, EAGLE, ANADROMOUS FISH, STRIPED BASS |
| | | 03 | | CRAB |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST; DELMARVA FOX SQUIRREL |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01834.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 17 |
| 00000605 | 010 | 01 | NAME OF AREA: | BLACKWATER RIVER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ISLE OF WIGHT; SOUTHAMPTON; SURRY |
| | 030 | 01 | QUADRANGLE: | FRANKLIN, VA; SEDLEY, VA; ZUNI, VA; RAYNOR, VA; |
| | | 02 | | RUNNYMEDE, VA; DENDRON, VA |
| | 040 | 01 | SIZE OF AREA: | 03514.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, TAXODIUM DISTICHUM, WIDE |
| | | 02 | | VARIETY OF FISH SPECIES. |
| | 180 | 01 | DESCRIPTION OF AREA: | SCENIC RIVER. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | LECHEA MARITIMA. PYXIDANTHERA BARBULATA. |
| | 410 | 01 | ECOLOGICAL RATING: | 16 |
| 00000620 | 010 | 01 | NAME OF AREA: | POROPOTANK MARSH - PURTAN MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | GLOUCESTER; KING AND QUEEN |
| | 030 | 01 | QUADRANGLE: | GRESSITT, VA |
| | 035 | 01 | COORDINATES: | 37 26 -- N 076 41 -- W |
| | 040 | 01 | SIZE OF AREA: | 02468.4 HA |
| | 060 | 01 | OWNER I: | LINDSEY, JOHN M. |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH JUNCUS ROEMERIANUS. OSPREY. |
| | | 02 | | OYSTERS. ANADROMOUS FISH. EAGLE. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN YORK RIVER WATERSHED. PRESENT USE IS PRIMARILY |
| | | 02 | | HUNTING PRESERVE FOR DUCKS, SHORE AND MARSH BIRDS. |
| | | 03 | | PRIME WETLAND. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 05239.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 15 |
| 00000645 | 010 | 01 | NAME OF AREA: | LILLY POINT MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEW KENT |
| | 030 | 01 | QUADRANGLE: | TUNSTALL, VA; NEW KENT, VA |
| | 040 | 01 | SIZE OF AREA: | 00517.1 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000645 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. SWAMP FOREST, HARDWOODS. ANADROMOUS FISH. |
| | | 02 | | IN PAMUNKEY AND YORK RIVERS WATERSHEDS. |
| | 180 | 01 | DESCRIPTION OF AREA: | CASSIA FASCICULATA VAR. MACROSPERMA |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | EAGLE NEST |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 01567.5 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 15 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| 00000681 | 010 | 01 | NAME OF AREA: | NANJEMOY CREEK - WARDS RUN |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | NANJEMOY, MD; MATHIAS POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 01010.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. MINK, OTTER, OSPREY, WOOD DUCK. LARGE MOUTH BASS. ANADROMOUS FISH. HERONRY. |
| | | 02 | | EAGLE NEST |
| | | 03 | | 03232.0 HA |
| 00000615 | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 15 |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | CHOTANK CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING GEORGE |
| | 030 | 01 | QUADRANGLE: | DAHLGREN, VA; KING GEORGE, VA |
| | 040 | 01 | SIZE OF AREA: | 00735.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| 00000627 | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER; POND |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. UPLAND MATURE HARDWOODS. BEAVER. ANADROMOUS FISH. TWO PAIRS OF EAGLES, NESTING. DUCKS, GEESE. |
| | | 02 | | IN POTOMAC RIVER WATERSHED. |
| | | 03 | | BALD EAGLE NESTS |
| | 180 | 01 | DESCRIPTION OF AREA: | GENERAL INFORMATION; WATER QUALITY INFORMATION |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 02626.0 HA |
| | 200 | 01 | CONTENTS IN MANUAL FILE: | 14 |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| 00000627 | 010 | 01 | NAME OF AREA: | POWHATAN CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | SURRY, VA |
| | 040 | 01 | SIZE OF AREA: | 00404.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 065 | 01 | OWNER II: | FEDERAL, AGENCY |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | | | | |
| | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-----------------------------|--|
| 00000627 | 170 | 01 | BIOTIC COMPONENTS: | TIDAL FRESHWATER MARSH VEGETATION, ANADROMOUS |
| | | 02 | | FISH, HERRING, SARRACENIA PURPUREA, SYMPLOCARPUS FOETIDUS |
| | | 03 | | AND CALTHA PALUSTRIS. IMPORTANT TREES INCLUDE QUERCUS BICOLOR, |
| | | 04 | | PINUS TAEDA, LIRIODENDRON TULIPIFERA, QUERCUS ALBA, ACER RUBRUM, |
| | | 05 | | CARPINUS CAROLINIANA, LIQUIDAMBAR STYRACIFLUA, ILEX OPACA |
| | | 06 | | AND MAGNOLIA VIRGINIANA. |
| | | 180 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. FOREST IS BEING SELECTIVELY |
| | | 190 | RARE AND ENDANGERED PLANTS: | CUT. |
| | | 400 | AREA INCL. BUFFER ZONE: | TRILLIUM PUSILLUM, ISOTRIA MEDEOLOIDES. |
| | | 410 | ECOLOGICAL RATING: | 00727.2 HA 14 |
| 00000636 | 010 | 01 | NAME OF AREA: | HOLLIS MARSH |
| | | 020 | | VIRGINIA |
| | | 021 | | WESTMORELAND |
| | | 030 | | STRATFORD HALL, VA; ST. CLEMENTS ISL., VA |
| | | 040 | | 00088.9 HA |
| | | 060 | | PRIVATE |
| | | 151 | OWNER I: | MARSH, TIDAL |
| | | 170 | AQUATIC TYPES: | HIGH TIDAL MARSH VEGETATION. OSPREY, HERONS, EGRETS. |
| | | | BIOTIC COMPONENTS: | CHAMAECYPARIS THYOIDES. BREEDING OF CLAPPER RAIL. |
| | | | DESCRIPTION OF AREA: | ABOUT 20 OSPREY NESTS. |
| 00000661 | 010 | 01 | NAME OF AREA: | IN POTOMAC RIVER WATERSHED. AT NORTHWEST END OF |
| | | 020 | | NOMINI BAY. NARROW SANDY BEACH ALONG NORTHERN SHORE. |
| | | 030 | | SHORT SAND SPIT AT EACH END OF ISLAND. PRIME WETLANDS. |
| | | 040 | | SEE ALSO RECORD 00000700, CURRIOMAN BAY. |
| | | 191 | | EAGLE NEST |
| | | 200 | | PUBLICATION |
| | | 301 | | ABBOTT, JACKSON M. |
| | | 302 | | 1955 |
| | | 303 | | THE HOLLIS MARSH ISLAND HERONRY |
| | | 304 | | ATLANTIC NAT. 12(2):71-74 |
| 00000661 | 010 | 01 | NAME OF AREA: | 14 |
| | | 020 | | FRESH POND |
| | | 021 | | MARYLAND |
| | | 030 | | ANNE ARUNDEL |
| | | 040 | | GIBSON ISLAND, MD |
| | | 060 | | 00052.5 HA |
| | | 181 | OWNER I: | PRIVATE |
| | | 170 | AQUATIC TYPES: | POND; BOG |
| | | | BIOTIC COMPONENTS: | UPLAND FOREST, QUERCUS - CARYA, ANIMAL SPECIES PRESENT |
| | | | DESCRIPTION OF AREA: | MAY POSSIBLY INCLUDE A RARE SPECIES OF DRAGONFLY, |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|---|
| 00000661 | 180 | 03 | CONTENTS IN MANUAL FILE: | SUBURBAN DEVELOPMENT. |
| | 200 | 01 | ECOLOGICAL RATING: | SPECIES LIST, PLANT |
| | 410 | 01 | | 14 |
| 00000794 | 010 | 01 | NAME OF AREA: | REED CREEK - GORDON POINT - WRIGHT NECK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | QUEEN ANNE |
| | 030 | 01 | QUADRANGLE: | LANGFORD CREEK, MD |
| | 040 | 01 | SIZE OF AREA: | 00416.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | 02 | | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. EAGLE. |
| | | 03 | | ANADROMOUS FISH, STRIPED BASS. ABUNDANT SHELLFISH. |
| | | 04 | | CRABS, CLAMS, SUNFISH. PERCH. HERONRY. WHISTLING |
| | | 05 | | SWAN. HARDWOOD FOREST. |
| | 180 | 01 | DESCRIPTION OF AREA: | REED CREEK IS SHORT TRIBUTARY OF CHESTER RIVER. |
| | | 02 | | A FEW LARGE FORMS ON THE INTERIOR SHORE. SEMI- |
| | | 03 | | SECLUDED. RECOMMENDED FOR PRESERVATION BY |
| | | 04 | | CHESAPEAKE BAY FOUNDATION. PRIME WETLAND. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01058.5 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 14 |
| 00000602 | 010 | 01 | NAME OF AREA: | CHICKAHOMINY, UPPER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | HENRICO; HANOVER; NEW KENT |
| | 030 | 01 | QUADRANGLE: | SEVEN PINES, VA; RICHMOND, VA; YELLOW PINES, VA |
| | 040 | 01 | SIZE OF AREA: | .02755.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | RIVER |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. A |
| | | 02 | | RARE INTRODUCED SPECIES, ANEILEMA KEISAK, OCCURS. |
| | | 03 | | BROAD EXTENSIVE FINE MARSHES. EAGLES, NESTING. |
| | | 04 | | IN JAMES RIVER WATERSHED. SCENIC RIVER. BOTTOMLAND |
| | | 05 | | FOREST NOT IMPRESSIVE. LOCATED NEAR INTERSTATE 95. |
| | 180 | 01 | DESCRIPTION OF AREA: | WOODED SWAMPS ALONG UNPOLLUTED CHICKAHOMINY RIVER. AREA |
| | | 02 | | IS NARROW DRAINAGE CHANNEL FOR EXTENSIVE SWAMPY REGION |
| | | 03 | | SUBJECT TO DEVELOPMENT PRESSURE FROM NORTHEAST SUBURBS |
| | | 04 | | OF RICHMOND. |
| | | 05 | | EAGLE NEST |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 13 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000635 | 010 | 01 | NAME OF AREA: | UPPER CHIPPOKES CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE GEORGE; SURRY |
| | 030 | 01 | QUADRANGLE: | SAVEDGE, VA |
| | 040 | 01 | SIZE OF AREA: | 00703.0 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000635 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. OSPREY. ANADROMOUS |
| | | 02 | | FISH, STRIPED BASS, HERRING. NEAR MATURE TAXODIUM |
| | | 03 | | DISTICHUM STAND. NEAR VIRGIN STATE OF RAVINE |
| | | 04 | | HARDWOODS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. MIOCENE FOSSILS. PRIME |
| | | 02 | | WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 02258.4 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 13 |
| 00000700 | 010 | 01 | NAME OF AREA: | CURRIOMAN BAY |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | WESTMORELAND |
| | 030 | 01 | QUADRANGLE: | STRATFORD HALL, VA |
| | 040 | 01 | SIZE OF AREA: | 02222.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | 02 | | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. UPLAND |
| | | 03 | | HARDWOODS. OSPREY. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC WATERSHED. PRIME WETLANDS. |
| | | 02 | | SEE ALSO RECORD 00000636, HOLLIS MARSH. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 13 |
| 00000777 | 010 | 01 | NAME OF AREA: | CEDAR POINT NECK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | MATHIAS POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 02020.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 065 | 01 | OWNER II: | FEDERAL, MILITARY |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | 02 | | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| | | 03 | | SWAMP FOREST, HARDWOODS. OTTER. MINK. CRABS. |
| | | 04 | | ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | NO PRESERVATION IN EFFECT ON PRIVATELY OWNED SECTION. |
| | | 02 | | APPROXIMATELY ONE HALF OF THE AREA COMPRISES THE |
| | | 03 | | BLOSSOM POINT PROVING GROUNDS. LOCATED ON NANJEMOY |
| | | 04 | | CREEK. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 13 |
| 00000779 | 010 | 01 | NAME OF AREA: | LLOYD CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000779 | 030 | 01 | QUADRANGLE: | COLONIAL BEACH NORTH, MD |
| | 040 | 01 | SIZE OF AREA: | 00016.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | 02 | | CYNOSUROIDES. EAGLE, OTTER, MINK, OVERWINTERING |
| | | 03 | | SWAN, CRABS AND OYSTERS. ANADROMOUS FISH, STRIPED |
| | | 04 | | BASS, OSPREY. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 13 |
| 00000831 | 010 | 01 | NAME OF AREA: | PASSMORE CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | SURRY, VA; HOG ISLAND, VA |
| | 040 | 01 | SIZE OF AREA: | 00242.4 HA |
| | 060 | 01 | OWNER I: | COLONIAL NATIONAL HISTORICAL PARK |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. SWAMP FOREST, HARDWOODS AND TAXODIUM |
| | | 02 | | DISTICHUM. THREE HERONRIES. OSPREY NEARBY. ANADROMOUS FISH. |
| | 410 | 01 | ECOLOGICAL RATING: | 13 |
| 00000614 | 010 | 01 | NAME OF AREA: | BLUFF POINT MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NORTHUMBERLAND |
| | 030 | 01 | QUADRANGLE: | FLEETS BAY, VA |
| | 040 | 01 | SIZE OF AREA: | 00117.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; POND, ESTUARINE |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. UPLAND MATURE |
| | | 02 | | HARDWOODS. OSPREY. OYSTERS. HERONRY, SHORE |
| | | 03 | | BIRDS AND WATERFOWL. |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLAND. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00723.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000621 | 010 | 01 | NAME OF AREA: | YARMOUTH ISLANDS - SIMPSON - WRIGHT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | NORGE, VA |
| | 040 | 01 | SIZE OF AREA: | 01151.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. SWAMP FOREST. |
| | | 02 | | HARDWOODS, TAXODIUM DISTICHUM. OSPREY, HERONRY. |
| | | 03 | | ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHICKAHOMINY RIVER WATERSHED. THE LITTLE CREEK AREA |
| | | 02 | | HAS BEEN PURCHASED BY CITY OF NEWPORT NEWS IN |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|------------------------------|--|
| 00000621 | 180 03 | | ANTICIPATION OF MAKING A RESERVOIR IN THIS PART OF THE |
| | 400 01 | AREA INCL. BUFFER ZONE: | WATERSHED. PRIME WETLAND. |
| | 410 01 | ECOLOGICAL RATING: | 02977.5 HA |
| | | | 12 |
| 00000622 | 010 01 | NAME OF AREA: | SMOOT TRACT |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | KING GEORGE |
| | 030 01 | QUADRANGLE: | KING GEORGE, VA |
| | 035 01 | COORDINATES: | 38 20 -- N 077 10 -- W |
| | 040 01 | SIZE OF AREA: | 00169.7 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS, OLD GROWTH EXCELLENT FOREST |
| | | | WITH LIRIODENDRON TULIPIFERA AND QUERCUS SPP. DOMINANT |
| | | | SHORE BIRDS. WATERFOWL. EAGLE. HEAVY DEER POPULATION. |
| | | | IN POTOMAC RIVER WATERSHED. LONG FRONTAGE OF BEACH AND |
| | | | MARSHLAND ALONG ONE SIDE OF TRACT. |
| | | DESCRIPTION OF AREA: | EAGLE NEST |
| | | RARE AND ENDANGERED ANIMALS: | 12 |
| | | ECOLOGICAL RATING: | |
| 00000632 | 010 01 | NAME OF AREA: | GORDON ISLAND |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | JAMES CITY |
| | 030 01 | QUADRANGLE: | BRANDON, VA; NORGE, VA |
| | 040 01 | SIZE OF AREA: | 00864.4 HA |
| | 060 01 | OWNER I: | POWHATAN HUNT CLUB |
| | 151 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. SWAMP FOREST, HARDWOODS |
| | | | AND TAXODIUM DISTICHUM. ZIZANIA SP., PELTANDRA SP. |
| | | | AND NUPHAR SP. OSPREY. |
| | | | IN CHICKAHOMINY AND JAMES RIVERS WATERSHEDS. PRIME |
| | | | WETLANDS. |
| | | DESCRIPTION OF AREA: | 02060.4 HA |
| | | AREA INCL. BUFFER ZONE: | 12 |
| | | ECOLOGICAL RATING: | |
| 00000634 | 010 01 | NAME OF AREA: | TERRAPIN POINT |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | NEW KENT; JAMES CITY |
| | 030 01 | QUADRANGLE: | TOANO, VA |
| | 040 01 | SIZE OF AREA: | 00565.6 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. OSPREY. OYSTERS. |
| | | | ANADROMOUS FISH. |
| | | | IN YORK RIVER WATERSHED. |
| | | DESCRIPTION OF AREA: | EAGLE NEST |
| | | RARE AND ENDANGERED ANIMALS: | 01971.5 HA |
| | | AREA INCL. BUFFER ZONE: | |
| | | | |
| | 180 01 | | |
| | 191 01 | | |
| | 400 01 | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

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| 00000634 | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000657 | 010 | 01 | NAME OF AREA: | CHICONE CREEK - BIG CREEK MARSH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | MARDELLA SPRINGS, MD; RHODESDALE, MD |
| | 040 | 01 | SIZE OF AREA: | 00735.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. SWAMP FOREST, PINUS |
| | | 02 | | SPP. AND CHAMAECYPARIS THYOIDES. OTTER, NUTRIA AND |
| | | 03 | | TERRAPIN. CRAB. ANADROMOUS FISH, STRIPED BASS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN NANTICOKE RIVER WATERSHED. PRIME WETLAND. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | ALNUS MARITIMA |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000660 | 010 | 01 | NAME OF AREA: | BACON RIDGE BRANCH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | SOUTH RIVER, MD; ROUND BAY, MD; ODENTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00286.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. SWAMP FOREST, HARDWOODS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | CLAMS AND CRABS. WOOD DUCK. YELLOW PERCH RUNS. |
| | 410 | 01 | ECOLOGICAL RATING: | 01442.3 HA |
| | | 12 | | 12 |
| 00000666 | 010 | 01 | NAME OF AREA: | KILLPECK CREEK - TRENT HALL CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | MECHANICSVILLE, MD |
| | 040 | 01 | SIZE OF AREA: | 00109.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH AND FRESHWATER MARSH VEGETATION WITH |
| | | 02 | | TYPHA SP. MINK, OTTER, OYSTER, CLAMS, OVERWINTERING |
| | | 03 | | SWAN AND WOOD DUCK. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PATUXENT RIVER WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01090.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000689 | 010 | 01 | NAME OF AREA: | PERRY BRANCH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 040 | 01 | SIZE OF AREA: | 00076.8 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|--|
| 00000689 | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA CYNOSUROIDES, MINK, OTTER, OSPREY. ANADROMOUS FISH, STRIPED BASS. CRAB. |
| | | 02 | | IN POTOMAC RIVER WATERSHED. |
| | 180 | 01 | DESCRIPTION OF AREA: | EAGLE NEST |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000713 | 010 | 01 | NAME OF AREA: | WEYANOKE POINT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHARLES CITY |
| | 030 | 01 | QUADRANGLE: | CHARLES CITY, VA |
| | 040 | 01 | SIZE OF AREA: | 00129.3 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. |
| | | 02 | | ANADROMOUS FISH. CASSIA FASCICULATA VAR. MACROSPERMA FOUND NEAR AREA. |
| | | 03 | | IN JAMES RIVER WATERSHED. PRIME WETLANDS. |
| | 180 | 01 | DESCRIPTION OF AREA: | CASSIA FASCICULATA VAR. MACROSPERMA |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00161.6 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000720 | 010 | 01 | NAME OF AREA: | GARNETTS CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING AND QUEEN |
| | 030 | 01 | QUADRANGLE: | KING AND QUEEN COURTHOUSE, VA |
| | 040 | 01 | SIZE OF AREA: | 00250.5 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES. ANADROMOUS FISH, STRIPED BASS AND HERRING. |
| | | 02 | | IN YORK RIVER WATERSHED. |
| | 180 | 01 | DESCRIPTION OF AREA: | BACOPA STRAGULA |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | CASSIA FASCICULATA VAR. MACROSPERMA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01547.3 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000746 | 010 | 01 | NAME OF AREA: | MARYLAND NECK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | KING GEORGE, MD |
| | | 02 | | WIDEMOY, MD |
| | 040 | 01 | SIZE OF AREA: | HEAD, MD |
| | 060 | 01 | OWNER 1: | QUANTICO, MD |
| | 151 | 01 | AQUATIC TYPES: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | MARSH |
| | | 02 | | UPLAND MATURE HARDWOODS. EAGLE, OSPREY. 93 PERCENT OF AREA IS WOODED. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. FOREST HAS BEEN LOGGED IN |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|---|
| 00000746 | 180 | 02 | | PAST. CONSISTS OF TWO REGIONS. THE FIRST, 3434 HA, LIES BETWEEN THE POTOMAC RIVER AND STATE ROUTE 224, HAS HIGH TIMBERED BLUFFS, SHALLOW COVES, AND MARSH. THE OTHER REGION IS ENCLOSED BY STATE ROUTES 6 AND 224 SOUTH OF THE TOWN OF NANJEMOY CONSISTS OF LARGE, FLAT, HEAVILY WOODED INLAND TRACTS. TOPOGRAPHY LEVEL TO ROLLING. |
| | | 03 | | EAGLE NEST |
| | | 04 | | MAP; GENERAL INFORMATION |
| | | 05 | | 12 |
| | | 06 | | |
| | | 07 | | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 200 | 01 | CONTENTS IN MANUAL FILE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000772 | 010 | 01 | NAME OF AREA: | SPRING CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | MECHANICSVILLE, MD |
| | 040 | 01 | SIZE OF AREA: | 00040.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. FRESHWATER MARSH WITH TYPHA SP. MINK, OTTER, OVERWINTERING SWANS, NESTING WOOD DUCKS, OYSTERS AND CLAMS. |
| | | 02 | | EAGLE NEST |
| | | 03 | | 00064.6 HA |
| | | 04 | | 12 |
| | | 05 | | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000778 | 010 | 01 | NAME OF AREA: | FRAZIER NECK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CAROLINE |
| | 030 | 01 | QUADRANGLE: | TRAPPE, MD; PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00258.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. OSPREY, OTTER, CRAB. ANADROMOUS FISH, STRIPED BASS, WHITE SHAD AND HICKORY SHAD. |
| | | 02 | | IN CHOPTANK RIVER WATERSHED. PRIME WETLANDS. |
| | | 03 | | DELMARVA FOX SQUIRREL |
| | | | | 00440.4 HA |
| | | | | 12 |
| | | | | |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000783 | 010 | 01 | NAME OF AREA: | BOW KNEE POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | TALBOT |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00129.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER; BOG |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|--|
| 00000783 | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. SPHAGNUM SPP. DEPOSIT. ANADROMOUS FISH, STRIPED BASS. DELMARVA FOX SQUIRREL. OSPREY. IN CHOPTANK RIVER WATERSHED. PRIME WETLAND. DELMARVA FOX SQUIRREL 12 |
| | | 02 | | |
| | | 03 | | |
| | | | | |
| 00000786 | 180 | 01 | DESCRIPTION OF AREA: | CHOPTANK RIVER - LYFORD LANDING MARYLAND CAROLINE HOBBS, MD 00327.2 HA PRIVATE SWAMP FOREST, HARDWOODS, PINUS SPP. OSPREY, OTTER, NESTING WOOD DUCKS. ANADROMOUS FISH, STRIPED BASS, HERRING, WHITE SHAD, HICKORY SHAD. IN CHOPTANK RIVER WATERSHED 12 |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | |
| | 020 | 01 | STATE: | |
| | 021 | 01 | COUNTY: | |
| | 030 | 01 | QUADRANGLE: | |
| | 040 | 01 | SIZE OF AREA: | |
| | 060 | 01 | OWNER I: | |
| 00000789 | 170 | 01 | BIOTIC COMPONENTS: | LLOYD LANDING MARYLAND TALBOT TRAPPE, MD; PRESTON, MD 00323.2 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH SCIRPUS SPP. OTTER, OSPREY AND CRABS. ANADROMOUS FISH, STRIPED BASS. IN CHOPTANK RIVER WATERSHED. PRIME WETLANDS. DELMARVA FOX SQUIRREL 12 |
| | | 02 | | |
| | | 03 | | |
| | | | | |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | |
| | 020 | 01 | STATE: | |
| 00000795 | 021 | 01 | COUNTY: | WYE EAST RIVER MARYLAND QUEEN ANNE; TALBOT WYE MILLS, MD 00133.3 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OTTER, CRABS. ANADROMOUS FISH, STRIPED BASS. WYE OAK. DELMARVA FOX SQUIRREL 00606.0 HA 12 |
| | 030 | 01 | QUADRANGLE: | |
| | 040 | 01 | SIZE OF AREA: | |
| | 060 | 01 | OWNER I: | |
| | 151 | 01 | AQUATIC TYPES: | |
| | 170 | 01 | BIOTIC COMPONENTS: | |
| | | 02 | | |
| | | 03 | | |
| | | 04 | | |
| | | | | |
| 00000806 | 191 | 01 | RARE AND ENDANGERED ANIMALS: | POPLAR HILL CREEK |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|--|
| 00000806 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | PINEY POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00303.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. BEAUTIFUL STAND OF PINUS SPP. |
| | | 02 | | AND MIXED HARDWOODS. OSPREY. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. ALONG SHORE POTOMAC |
| | | 02 | | RIVER ESTUARY. NO IMMINENT PRESERVATION PROBLEMS. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00694.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 12 |
| 00000613 | 010 | 01 | NAME OF AREA: | SUNKEN MEADOW |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | SURRY |
| | 030 | 01 | QUADRANGLE: | CLAREMONT, VA |
| | 040 | 01 | SIZE OF AREA: | 00444.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | POND |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. TAXODIUM DISTICHUM PRESENT IN POND. |
| | 180 | 02 | | IN JAMES RIVER WATERSHED. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | EUPATORIUM SALTUENSE |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000618 | 010 | 01 | NAME OF AREA: | ACCAKEEK CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | STAFFORD |
| | 030 | 01 | QUADRANGLE: | PASSAPATANZY, VA; WIDEWATER, VA; STAFFORD, VA |
| | 040 | 01 | SIZE OF AREA: | 00327.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | NELUMBO SP. (LOTUS LILY) MARSH. SPARTINA |
| | | 02 | | CYNOSUROIDES. NORTHERN LIMIT OF ZIZANIOPSIS MILLIACEA. |
| | | 03 | | ANADROMOUS FISH, HERRING. ERIANTHUS RAVENNAE, A RARE |
| | | 04 | | INTRODUCED SPECIES FROM SOUTHERN EUROPE, OCCURS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01309.0 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000639 | 010 | 01 | NAME OF AREA: | PARSONS ISLAND - OLD NECK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHARLES CITY |
| | 030 | 01 | QUADRANGLE: | BRANDON, VA |
| | 040 | 01 | SIZE OF AREA: | 00541.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000639 | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. SWAMP FOREST. |
| | | 02 | | HARDWOODS, TAXODIUM DISTICHUM. OSPREY, |
| | | 03 | | ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHICKAHOMINY AND JAMES RIVERS WATERSHEDS. |
| | | 02 | | PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00888.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000640 | 010 | 01 | NAME OF AREA: | WEST ISLAND |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEW KENT |
| | 030 | 01 | QUADRANGLE: | NEW KENT, VA |
| | 040 | 01 | SIZE OF AREA: | 00476.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. SWAMP FOREST, HARDWOODS. |
| | | 02 | | EAGLE NEST ACROSS FROM MARSH, NORTH OF SOUTHERN |
| | | 03 | | RAILROAD TRACK. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS. PRIME WETLANDS. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000670 | 010 | 01 | NAME OF AREA: | GREEN BRIER SWAMP |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | BLACKWATER R., MD |
| | 040 | 01 | SIZE OF AREA: | 01858.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. OTTER, |
| | | 02 | | TURKEY AND DELMARVA FOX SQUIRREL. |
| | 180 | 01 | DESCRIPTION OF AREA: | AREA IS BEING DRAINED AND CLEARED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | DELMARVA FOX SQUIRREL |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000672 | 010 | 01 | NAME OF AREA: | MATTAWOMAN CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | INDIAN HEAD, MD; PORT TOBACCO, MD |
| | 040 | 01 | SIZE OF AREA: | 01559.4 HA |
| | 060 | 01 | OWNER I: | STATE |
| | 065 | 01 | OWNER II: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, QUERCUS - CARVA. OTTER, |
| | | 02 | | MINK, OSPREY, BEAVER. NELUMBO SP. LARGEST |
| | | 03 | | CONCENTRATION OF NESTING WOOD DUCK IN MARYLAND. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PCTOMAC RIVER WATERSHED. PART OF AREA IN MYRTLE |
| | | 02 | | GROVE WILDLIFE MANAGEMENT AREA AND GENERAL |
| | | 03 | | SMALLWOOD STATE PARK |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|------------------------------|--|
| 00000672 | 200 01 | CONTENTS IN MANUAL FILE: | GENERAL INFORMATION |
| | 400 01 | AREA INCL. BUFFER ZONE: | 03947.1 HA |
| | 410 01 | ECOLOGICAL RATING: | 11 |
| | | | TUCKAHOE CREEK |
| 00000687 | 010 01 | NAME OF AREA: | MARYLAND |
| | 020 01 | STATE: | CAROLINE; TALBOT |
| | 021 01 | COUNTY: | FOWLING CREEK, MD; RIDGELY, MD |
| | 030 01 | QUADRANGLE: | |
| | 040 01 | SIZE OF AREA: | 00989.8 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. OTTER, OSPREY, WOOD DUCK, ANADROMOUS FISH, STRIPED BASS SPAWNING, WHITE SHAD, HICKORY SHAD, HERRING, PINUS TAEDA, PINUS VIRGINIANA, QUERCUS SPP. WOODED PORTIONS IN CHOPTANK RIVER WATERSHED. BEAUTIFUL INTERSPERSED WITH DEEP FRESH MARSHES. SHORELINE FOR 12 MILES ON BOTH SIDES OF TUCKAHOE CREEK. PRIME WETLAND. |
| | 180 01 | DESCRIPTION OF AREA: | |
| | 02 02 | | |
| | 03 03 | | |
| | 04 04 | | |
| | 410 01 | ECOLOGICAL RATING: | 11 |
| 00000710 | 010 01 | NAME OF AREA: | BROAD CREEK MARSH |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | RICHMOND; ESSEX |
| | 030 01 | QUADRANGLE: | MOUNT LANDING, VA; CHAMPLAIN, VA |
| | 040 01 | SIZE OF AREA: | 00206.0 HA |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OSPREY, ANADROMOUS FISH, HERRING AND STRIPED BASS. IN RAPPAHANNOCK RIVER WATERSHED. PRIME WETLANDS. |
| | 180 01 | DESCRIPTION OF AREA: | |
| | 191 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 01 | AREA INCL. BUFFER ZONE: | 01212.0 HA |
| | 410 01 | ECOLOGICAL RATING: | 11 |
| | | | DRAKES MARSH - OTTERBURN MARSH |
| | | | VIRGINIA |
| 00000719 | 010 01 | NAME OF AREA: | WESTMORELAND; ESSEX |
| | 020 01 | STATE: | LORETO, VA; CHAMPLAIN, VA |
| | 021 01 | COUNTY: | |
| | 030 01 | QUADRANGLE: | |
| | 040 01 | SIZE OF AREA: | 00488.8 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL; RIVER |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. EAGLE NEST LOCATED ON SOUTH BANK OF RAPPAHANNOCK RIVER AT EDGE OF COLEMAN CREEK. ANADROMOUS FISH. IN RAPPAHANNOCK RIVER WATERSHED. PRIME WETLANDS. |
| | 180 01 | DESCRIPTION OF AREA: | |
| | 191 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 02 02 | | |
| | 03 03 | | |
| | 04 04 | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000719 | 400 | 01 | AREA INCL. BUFFER ZONE: | 00654.5 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000735 | 010 | 01 | NAME OF AREA: | WYE RIVER |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | QUEEN ANNE |
| | 030 | 01 | QUADRANGLE: | QUEENSTOWN, MD |
| | 040 | 01 | SIZE OF AREA: | 00141.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH, GEESE, ANADROMOUS FISH, STRIPED |
| | | 02 | | BASS, CRAB, OTTER. |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLANDS. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000780 | 010 | 01 | NAME OF AREA: | LOWER MARSHYHOPE CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | RHODESDALE, MD |
| | 040 | 01 | SIZE OF AREA: | 00828.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, CHAMAECYPARIS THYOIDES AND PINUS SP. |
| | | 02 | | OTTER, NESTING WOOD DUCKS, ANADROMOUS FISH, STRIPED |
| | | 03 | | BASS, HERRING, WHITE SHAD AND HICKORY SHAD. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | ALNUS MARITIMA |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000784 | 010 | 01 | NAME OF AREA: | CHICAMUXEN CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | INDIAN HEAD, MD |
| | 040 | 01 | SIZE OF AREA: | 00270.7 HA |
| | 060 | 01 | OWNER I: | FEDERAL, MILITARY |
| | 065 | 01 | OWNER II: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. AND SCIRPUS SPP. |
| | | 02 | | MINK, OTTER, EAGLE, CRABS. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00444.4 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 11 |
| 00000785 | 010 | 01 | NAME OF AREA: | CHOPTANK RIVER (BRUCEVILLE) |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | TALBOT |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00218.2 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
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| 00000785 | 060 | 01 | OWNER I: | PRIVATE MARSH, FRESHWATER; RIVER FRESHWATER MARSH WITH TYPHA SP. TERRAPIN, CRAB AND OYSTER. ANADROMOUS FISH, STRIPED BASS, SHAD. CATFISH, PERCH AND BULLHEADS SPAWNING AREA. OSPREY. IN CHOPTANK RIVER WATERSHED. NO PRESERVATION IN EFFECT. NO IMMINENT PROBLEMS. OUTSTANDING WILDLIFE HABITAT OF TYPE RAPIDLY DISAPPEARING IN MARYLAND. PRIME WETLAND. WATER QUALITY INFORMATION |
| | 151 | 01 | AQUATIC TYPES: | |
| | 170 | 02 | BIOTIC COMPONENTS: | |
| | 180 | 03 | DESCRIPTION OF AREA: | |
| | 200 | 04 | CONTENTS IN MANUAL FILE: | |
| 00000311 | 410 | 01 | ECOLOGICAL RATING: | 11 |
| | 010 | 01 | NAME OF AREA: | HELLEN CREEK HEMLOCK PRESERVE |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | COVE POINT, MD; SOLOMONS ISLAND, MD, 7.5 |
| | 035 | 01 | COORDINATES: | 38 22 -- N 076 27 -- W |
| | 060 | 01 | OWNER I: | NATURE CONSERVANCY, THE |
| | 170 | 02 | BIOTIC COMPONENTS: | SWAMP FOREST OF TSUGA CANADENSIS, KALMIA LATIFOLIA, FAGUS GRANDIFOLIA, QUERCUS SPP. AND PINUS SPP. INTERMINGLED. VIRGINIANA DOMINANT ON AREA FORMERLY CULTIVATED. OTTER, CRAB AND TERRAPIN PRESENT. |
| | 180 | 04 | DESCRIPTION OF AREA: | STAND OF TSUGA CANADENSIS NEAR EDGE OF TIDAL MARSH MARSH. MOST SOUTHERN KNOWN STAND OF HEMLOCK ALONG COAST. |
| | 200 | 03 | CONTENTS IN MANUAL FILE: | MOST SOUTHERN KNOWN GROWTH OF TSUGA CANADENSIS ALONG COAST. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | SPECIES LIST, PLANT |
| | 410 | 01 | ECOLOGICAL RATING: | 00331.3 HA 10 |
| | | | | NOTE: SHOULD CONTINUE TO RECEIVE SPECIAL CONSIDERATION |
| 00000612 | 010 | 01 | NAME OF AREA: | POTOMAC CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | STAFFORD |
| | 030 | 01 | QUADRANGLE: | FREDERICKSBURG, VA; PASSAPATANZY, VA |
| | 040 | 01 | SIZE OF AREA: | 00537.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 02 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. EAGLE. HERONRY. ANADROMOUS FISH, HERRING. IN POTOMAC RIVER WATERSHED. |
| | 180 | 01 | DESCRIPTION OF AREA: | EAGLE |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 02149.2 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 10 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000616 | 010 | 01 | NAME OF AREA: | MORRIS CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHARLES CITY |
| | 030 | 01 | QUADRANGLE: | BRANDON, VA |
| | 040 | 01 | SIZE OF AREA: | 00452.5 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000616 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION, SWAMP FOREST, HARDWOODS, TAXODIUM DISTICHUM, OSPREY, ANADROMOUS FISH, HERRING, IN CHICKAHOMINY AND JAMES RIVERS WATERSHEDS. |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 02076.7 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000626 | 010 | 01 | NAME OF AREA: | CHISEL RUN BOG |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | NORGE, VA |
| | 040 | 01 | SIZE OF AREA: | 00040.4 HA |
| | 060 | 01 | OWNER I: | EASTERN VIRGINIA STATE HOSPITAL |
| | 065 | 01 | OWNER II: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | BOG |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | JUNCUS CAESARIENSIS, ISOTRIA MEDEOLOIDES |
| | 410 | 01 | ECOLOGICAL RATING: | 10 NOTE: BOG SHOULD RECEIVE SPECIAL CONSIDERATION |
| 00000629 | 010 | 01 | NAME OF AREA: | BRIDGES CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | WESTMORELAND |
| | 030 | 01 | QUADRANGLE: | COLONIAL BEACH SO., VA |
| | 040 | 01 | SIZE OF AREA: | 00097.0 HA |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION, OYSTERS, ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00404.0 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000637 | 010 | 01 | NAME OF AREA: | MARSH POINT - GREEN BAY - HORSE HEAD POINT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ESSEX |
| | 030 | 01 | QUADRANGLE: | ROLLINS FORK, VA |
| | 040 | 01 | SIZE OF AREA: | 1333.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM, EAGLE NEST ACROSS RAPPAHANNOCK RIVER FROM MARSH, NORTH OF OWL HOLLOW. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED, PRIME WETLANDS. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00551.0 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000643 | 010 | 01 | NAME OF AREA: | COUSIAC MARSH |
| | 020 | 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000643 | 021 | 01 | COUNTY: | NEW KENT |
| | 030 | 01 | QUADRANGLE: | NEW KENT, VA |
| | 040 | 01 | SIZE OF AREA: | 00444.4 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION, SWAMP FOREST, |
| | | 02 | | HARDWOODS, EAGLE NEST, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS, |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00808.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| | | | | |
| | | | | |
| 00000644 | 010 | 01 | NAME OF AREA: | ELTHAM MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | WEST POINT, VA |
| | 040 | 01 | SIZE OF AREA: | 00492.9 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION, OSPREY, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS, |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00646.4 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| | | | | |
| 00000652 | 010 | 01 | NAME OF AREA: | HILL MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEW KENT |
| | 030 | 01 | QUADRANGLE: | NEW KENT, VA; WEST POINT, VA |
| | 040 | 01 | SIZE OF AREA: | 00545.4 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION, OSPREY, EAGLE NEST, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS, |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00658.5 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| | | | | |
| 00000653 | 010 | 01 | NAME OF AREA: | LEE MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | WEST POINT, VA |
| | 040 | 01 | SIZE OF AREA: | 00634.3 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION, ANADROMOUS FISH, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS, PRIME |
| | | 02 | | WETLANDS. |
| | | | | |
| | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000653 | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00929.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000673 | 010 | 01 | NAME OF AREA: | SWAN POINT NECK - WISE MARSH - NEALE SOUND - WEIR CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | MORGANTOWN, MD |
| | 040 | 01 | SIZE OF AREA: | 00602.0 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES. OTTER, MINK, OSPREY, CRAB AND OYSTER. ANADROMOUS FISH, STRIPED BASS. OVERWINTERING SWAN. IN POTOMAC RIVER WATERSHED. |
| | | 02 | | 10 |
| | | 03 | | |
| 00000677 | 180 | 01 | DESCRIPTION OF AREA: | WAREHOUSE CREEK |
| | 410 | 01 | ECOLOGICAL RATING: | MARYLAND |
| | 010 | 01 | NAME OF AREA: | QUEEN ANNE |
| | 020 | 01 | STATE: | KENT ISLAND, MD |
| | 021 | 01 | COUNTY: | 00315.1 HA |
| | 030 | 01 | QUADRANGLE: | PRIVATE |
| | 040 | 01 | SIZE OF AREA: | MARSH, TIDAL |
| | 060 | 01 | OWNER 1: | HIGH TIDAL MARSH WITH PHRAGMITES SP. OSPREY, OTTER, ANADROMOUS FISH, STRIPED BASS. RICH IN BIRD LIFE. ABUNDANT SHELLFISH. WINTERING WHISTLING SWAN. LONG, LOW LYING PENINSULA WITH NUMEROUS BAYS, CREEKS, COVES AND LAGOONS. AREA IS OF KEY IMPORTANCE TO BIRD MIGRATION PATTERNS. |
| | 151 | 01 | AQUATIC TYPES: | 10 |
| | 170 | 01 | BIOTIC COMPONENTS: | |
| | | 02 | | |
| | | 03 | | |
| 00000679 | 180 | 01 | DESCRIPTION OF AREA: | HOWELL POINT |
| | 410 | 01 | ECOLOGICAL RATING: | MARYLAND |
| | 010 | 01 | NAME OF AREA: | KENT |
| | 020 | 01 | STATE: | BETTERTON, MD |
| | 021 | 01 | COUNTY: | 00222.2 HA |
| | 030 | 01 | QUADRANGLE: | PRIVATE |
| | 040 | 01 | SIZE OF AREA: | SWAMP |
| | 060 | 01 | OWNER 1: | SWAMP FOREST, HARDWOODS. OTTER, OSPREY, WOOD DUCK, ANADROMOUS FISH, SHAD, HERRING, STRIPED BASS. PRIME WETLAND. |
| | 151 | 01 | AQUATIC TYPES: | 00711.0 HA |
| | 170 | 01 | BIOTIC COMPONENTS: | 10 |
| | | 02 | | |
| | | 03 | | |
| 00000685 | 180 | 01 | DESCRIPTION OF AREA: | KINGS CREEK - KINGSTON LANDING |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | MARYLAND |
| | 410 | 01 | ECOLOGICAL RATING: | TALBOT |
| | 010 | 01 | NAME OF AREA: | |
| | 020 | 01 | STATE: | |
| | 021 | 01 | COUNTY: | |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000685 | 030 | 01 | QUADRANGLE: | FOWLING CREEK, MD |
| | 040 | 01 | SIZE OF AREA: | 00767.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER; SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. SWAMP FOREST. |
| | | 02 | | CHAMAECYPARIS THYOIDES. OTTER, ANADROMOUS FISH, |
| | | 03 | | STRIPED BASS, WHITE SHAD, HICKORY SHAD, HERRING. |
| | | 01 | | IN CHOPTANK RIVER WATERSHED. PRIME WETLAND. |
| | 180 | 01 | DESCRIPTION OF AREA: | 10 NOTE: AREA SHOULD RECEIVE SPECIAL CONSIDERATION |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000691 | 010 | 01 | NAME OF AREA: | REWASTICO CREEK - ROUND ISLAND - FERRY POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | WICOMICO |
| | 030 | 01 | QUADRANGLE: | MARDELLA SPRINGS, MD |
| | 040 | 01 | SIZE OF AREA: | 01923.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. OSPREY, OTTER, ANADROMOUS |
| | | 02 | | FISH, STRIPED BASS, WHITE SHAD, HICKORY SHAD, |
| | | 03 | | ALEWIFE. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN NANTICOKE RIVER WATERSHED. PRIME WETLANDS. |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000695 | 010 | 01 | NAME OF AREA: | BARKERS CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | TALBOT |
| | 030 | 01 | QUADRANGLE: | TRAPPE, MD; PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00153.5 HA |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. DELMARVA FOX SQUIRREL, |
| | | 02 | | OSPREY. ANADROMOUS FISH, STRIPED BASS SPAWNING. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | DELMARVA FOX SQUIRREL |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000703 | 010 | 01 | NAME OF AREA: | BELL SWAMP - OWEN POND |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NORTHUMBERLAND |
| | 030 | 01 | QUADRANGLE: | REEDVILLE, VA |
| | 040 | 01 | SIZE OF AREA: | 00347.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | POND |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS. OSPREY. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| 00000707 | 010 | 01 | NAME OF AREA: | LITTLE CARTER CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000707 | 021 | 01 | COUNTY: | RICHMOND |
| | 030 | 01 | QUADRANGLE: | TAPPAHANNOCK, VA |
| | 040 | 01 | SIZE OF AREA: | 00892.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH, SPARTINA CYNOSUROIDES, ANADROMOUS FISH, HERRING AND STRIPED BASS. |
| | | 02 | | IN RAPPAHANNOCK WATERSHED, PRIME WETLANDS. |
| | 180 | 01 | DESCRIPTION OF AREA: | EAGLE NEST |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 02424.0 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 10 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | 01 | NAME OF AREA: | PERSIMMON POINT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING GEORGE |
| 00000711 | 030 | 01 | QUADRANGLE: | DAHLGREN, VA† MATHIAS POINT, VA |
| | 040 | 01 | SIZE OF AREA: | 00210.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND PINE SUCCESSIONAL COMMUNITY, UPLAND MATURE HARDWOODS, EAGLE, OVERWINTERING SWANS AND CANVASBACK DUCKS, PINUS PALUSTRIS. |
| | | 02 | | |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00630.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| | | 01 | NAME OF AREA: | CLEVE MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING GEORGE |
| | 030 | 01 | QUADRANGLE: | PORT ROYAL, VA† RAPPAHANNOCK ACADEMY, VA |
| | 040 | 01 | SIZE OF AREA: | 00391.9 HA |
| 00000717 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER! RIVER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES, EAGLE NESTS ACROSS RIVER FROM MARSH, ANADROMOUS FISH. |
| | | 02 | | IN RAPPAHANNOCK RIVER WATERSHED, PRIME WETLANDS. |
| | 180 | 01 | DESCRIPTION OF AREA: | EAGLE NEST |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | 00412.1 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 10 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | 01 | NAME OF AREA: | SWAN POINT - TAVERN CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | KENT |
| | 030 | 01 | QUADRANGLE: | SWAN POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00242.4 HA |
| 00000773 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH, PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS, OTTER, OSPREY AND NESTING WOOD DUCKS, ANADROMOUS FISH, .- |
| | | 02 | | |
| | | 03 | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|--|--|---|
| 00000773 | 170 04 180 01 410 01 | DESCRIPTION OF AREA: ECOLOGICAL RATING: | STRIPED BASS. CRABS. OYSTERS. PRIME WETLAND. 10 |
| 00000776 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 180 01 191 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: DESCRIPTION OF AREA: RARE AND ENDANGERED ANIMALS: ECOLOGICAL RATING: | ST. MARY'S RIVER MARYLAND ST. MARY'S ST. MARY'S CITY, MD 00125.2 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH TYPHA SP. MINK. NESTING WOOD DUCKS. ARCHAEOLOGICAL EXCAVATION OF RUINS OF 17TH CENTURY HOME OF CHARLES CALVERT, COLONIAL GOVERNOR OF MARYLAND. EAGLE NEST 10 |
| 00000781 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 180 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: DESCRIPTION OF AREA: ECOLOGICAL RATING: | NICHOLS POINT MARYLAND KENT LANGFORD CREEK, MD 00064.6 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OTTER, OSPREY, CRABS, OYSTER. NESTING WOOD DUCKS. OVERWINTERING WHISTLING SWAN. IN CHESTER RIVER WATERSHED. PRIME WETLANDS. 10 |
| 00000828 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 180 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: DESCRIPTION OF AREA: ECOLOGICAL RATING: | MATTAWOMAN CREEK, UPPER MARYLAND CHARLES; PRINCE GEORGES PISCATAWAY 00686.8 HA PRIVATE SWAMP SWAMP FOREST, HARDWOODS. OTTER, MINK, OSPREY, BEAVER AND WOOD DUCK. ANADROMOUS FISH, HERONRY. 10 |
| 00000829 | 010 01 020 01 021 01 030 01 040 01 060 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: | CHOPAWAMSIK CREEK VIRGINIA PRINCE WILLIAM; STAFFORD QUANTICO, VA 01442.3 HA FEDERAL |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000829 | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH. ANADROMOUS FISH. HERONRY. |
| | 410 | 01 | ECOLOGICAL RATING: | 10 |
| | | | | |
| 00000619 | 010 | 01 | NAME OF AREA: | GRAYS CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | SURRY |
| | 030 | 01 | QUADRANGLE: | SURRY, VA |
| | 035 | 01 | COORDINATES: | 37 10 -- N 076 47 32 W |
| | 040 | 01 | SIZE OF AREA: | 00456.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. SWAMP FOREST. |
| | | 02 | | HARDWOODS, TAXODIUM DISTICHUM. ANADROMOUS FISH. |
| | | 03 | | HERRING. TYPHA SP., PELTANDRA SP., SPARTINA SP., |
| | | 04 | | PONTERERIA SP. AND KALMIA SP. |
| | | | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED |
| | 180 | 01 | AREA INCL. BUFFER ZONE: | 03211.8 HA |
| 00000656 | 400 | 01 | ECOLOGICAL RATING: | 09 |
| | 410 | 01 | | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | CHAPTICO RUN |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | ROCK POINT, VA |
| | 040 | 01 | SIZE OF AREA: | 00218.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES. |
| | | 02 | | FRESHWATER MARSH WITH TYPHA SP. OSPREY, BEAVER, |
| | | 03 | | OTTER, MINK AND TERRAPIN PRESENT. CRABS. ANADROMOUS |
| 00000668 | 180 | 01 | DESCRIPTION OF AREA: | FISH, SHAD, HERRING. WOOD DUCK. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | IN POTOMAC RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 00404.0 HA |
| | | 01 | | 09 |
| | | | | |
| | 010 | 01 | NAME OF AREA: | COVE POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | COVE POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00084.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | TIDAL MARSH WITH PHRAGMITES, OTTER. NORTHERNMOST |
| | | 02 | | POINT OF DISTRIBUTION FOR NARROWMOUTH FROG. |
| 00000669 | 191 | 01 | RARE AND ENDANGERED ANIMALS: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | EAGLE NEST |
| | 410 | 01 | ECOLOGICAL RATING: | 00214.1 HA |
| | | 01 | | 09 |
| | 010 | 01 | NAME OF AREA: | FLAT CREEK |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|--|
| 00000669 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | SOUTH RIVER, MD |
| | 040 | 01 | SIZE OF AREA: | 00121.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. MATURE FAGUS GRANDIFOLIA |
| | 180 | 01 | DESCRIPTION OF AREA: | WOODS. WOOD DUCK. CRABS AND CLAMS. OSPREY. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | IN SOUTH RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 03212.1 HA 09 |
| 00000675 | 010 | 01 | NAME OF AREA: | FISHING CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | CLAIBORNE, MD |
| | 040 | 01 | SIZE OF AREA: | 00355.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. SPARTINA CYNOSUROIDES. OTTER, |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE, WOOD DUCK. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | EAGLE NEST |
| 00000678 | 010 | 01 | NAME OF AREA: | DEEP LANDING |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | BENEDICT, MD |
| | 040 | 01 | SIZE OF AREA: | 00080.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH, WITH TYPHA SP. MINK, OTTER, WILSON |
| | 180 | 01 | DESCRIPTION OF AREA: | SNIPE, WOOD DUCK, CANVASBACK, GREAT BLUE HERON NESTING, |
| | 410 | 01 | ECOLOGICAL RATING: | ANADROMOUS FISH, HERRING, SHAD, CRAB. IN PATUXENT WATERSHED. PRIME WETLAND. 09 |
| 00000682 | 010 | 01 | NAME OF AREA: | SOUTH MARSH ISLAND |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | SOMERSET |
| | 030 | 01 | QUADRANGLE: | KEDGES STRAITS, MD; BLOODSWORTH ISL., MD |
| | 040 | 01 | SIZE OF AREA: | 01224.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. CLAPPER RAIL, TERRAPIN, OSPREY. |
| | 180 | 01 | DESCRIPTION OF AREA: | ANADROMOUS FISH, STRIPED BASS, CRAB, CLAM, OYSTER. |
| | 190 | 01 | ECOLOGICAL RATING: | PRIME WETLANDS. |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|------------------------------|---|
| 00000682 | 400 | 01 | AREA INCL. BUFFER ZONE: | 01939.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 09 |
| 00000683 | 010 | 01 | NAME OF AREA: | BURGESS CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | MATHIAS POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00319.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. MINK, OTTER, |
| | | 02 | | ANADROMOUS FISH, HERRING, CRAB. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01090.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 09 |
| 00000701 | 010 | 01 | NAME OF AREA: | DOGUE CREEK, UPPER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | FAIRFAX |
| | 030 | 01 | QUADRANGLE: | BELVOIR, VA; ANNANDALE, VA; ALEXANDRIA, VA; MT. |
| | | 02 | | VERNON, VA |
| | 040 | 01 | SIZE OF AREA: | 00779.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 065 | 01 | OWNER II: | FEDERAL, MILITARY |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS. UPLAND MATURE HARDWOODS. |
| | | 02 | | UPLAND PINE, SUCCESSIONAL. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 09 |
| 00000724 | 010 | 01 | NAME OF AREA: | HERRING CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHARLES CITY |
| | 030 | 01 | QUADRANGLE: | WESTOVER, VA |
| | 040 | 01 | SIZE OF AREA: | 00375.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | ANADROMOUS FISH, HERRING. FRESHWATER MARSH SPECIES. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. PRIME WETLANDS. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | CASSIA FASCICULATA VAR. MACROSPERMA |
| | 410 | 01 | ECOLOGICAL RATING: | 09 |
| 00000770 | 010 | 01 | NAME OF AREA: | CHESTNUT POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | DEAL, MD |
| | 040 | 01 | SIZE OF AREA: | 00157.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | |
|----------|-----|----|-------------------------|
| 00000770 | 065 | 01 | OWNER 11: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | | 03 | |
| | | 04 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000771 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER 1: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | | 03 | |
| | | 04 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | | 02 | |
| | | 03 | |
| | | 04 | |
| | | 05 | |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000791 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER 1: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | 400 | 01 | AREA INCL. BUFFER ZONE: |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000830 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER 1: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |

| |
|--|
| FEDERAL, AGENCY |
| MARSH, TIDAL |
| HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| OTTER, MINK, OSPREY. ANADROMOUS FISH, ALEWIVES. |
| CRABS, CLAMS AND OYSTERS. OVERWINTERING SWAN. |
| SANDY POINT. |
| 09 |
| SAVANNAH LAKE |
| MARYLAND |
| DORCHESTER |
| CHICAMACOMICO, MD; NANTICOKE, MD |
| 00937.3 HA |
| PRIVATE |
| POND; MARSH, FRESHWATER |
| TERRAPIN, OTTER, NUTRIA, OYSTER, CRAB. ANADROMOUS |
| FISH, STRIPED BASS. ABUNDANT BASS, BLUEGILL AND |
| CATFISH. TWIGRUSH, DOMINANT SPECIES, AT SOUTHERN |
| LIMIT. VALISNERIA AMERICANA. |
| IN NANTICOKE RIVER WATERSHED. MAXIMUM DEPTH OF POND |
| IS 2.3 M, AVERAGE DEPTH IS 1 M. ONE OF FEW REMAINING |
| MAJOR PONDS IN MARYLAND. SURROUNDED BY FRESHWATER |
| MARSH. AREA IS CONTROLLED BY A GUN CLUB WHICH SEEMS |
| TO BE GAME MANAGEMENT ORIENTED. PRIME WETLAND. |
| 09 |
| MORGAN CREEK |
| MARYLAND |
| KENT |
| BETTERTON, MD; CHESTERTOWN, MD |
| 00440.4 HA |
| PRIVATE |
| MARSH, FRESHWATER |
| FRESHWATER MARSH WITH TYPHA SP. SWAMP FOREST, HARDWOODS. |
| OTTER. NESTING WOOD DUCKS. ANADROMOUS FISH. |
| IN CHESTER RIVER WATERSHED. PRIME WETLANDS. |
| 01923.0 HA |
| 09 |
| GAMBO CREEK MARSH |
| VIRGINIA |
| KING GEORGE |
| DAHLGREN, VA |
| 00117.2 HA |
| U.S. NAVAL RESERVOIR |
| MARSH, TIDAL |
| HIGH TIDAL MARSH. ANADROMOUS FISH. OYSTERS. EAGLE ABOUT |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000830 | 170 | 02 | ECOLOGICAL RATING: | ONE AND ONE HALF MILES AWAY. |
| | 410 | 01 | | 09 |
| 00000606 | 010 | 01 | NAME OF AREA: | MATTAPONI RIVER, UPPER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM; KING AND QUEEN |
| | 030 | 01 | QUADRANGLE: | AYLETT, VA; YORK, VA |
| | 040 | 01 | SIZE OF AREA: | 02496.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, TAXODIUM DISTICHUM. |
| | | 02 | | ANADROMOUS FISH, STRIPED BASS, HERRING. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN YORK RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| 00000633 | 010 | 01 | NAME OF AREA: | PISCATAWAY CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ESSEX |
| | 030 | 01 | QUADRANGLE: | MOUNT LANDING, VA; TAPPAHANNOCK, VA; DUNNSVILLE, VA; |
| | | 02 | | MILLERS TAVERN, VA |
| | 040 | 01 | SIZE OF AREA: | 00900.9 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. OSPREY. ANADROMOUS |
| | | 02 | | FISH, HERRING, STRIPED BASS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED. PRIME WETLAND. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 02710.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| 00000641 | 010 | 01 | NAME OF AREA: | BIG MARSH - TOBASCO ISLAND - SAVAGE ISLAND |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | CHESCONESSEX, VA |
| | 040 | 01 | SIZE OF AREA: | 03094.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLANDS. |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| 00000658 | 010 | 01 | NAME OF AREA: | DEEP COVE CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | DEALE, MD |
| | 040 | 01 | SIZE OF AREA: | 00141.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES. OTTER, MINK, |
| | | 02 | | TERRAPIN, OSPREY, CRAB, CLAM AND OYSTERS. ANADROMOUS FISH. |

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|-----------|--|--|--|
| 000000658 | 170 03 410 01 | ECOLOGICAL RATING: | STRIPED BASS. 08 |
| 000000659 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: | PRINCIPIO CREEK MARYLAND CECIL HAYRE DE GRACE, VA 00080.8 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH SCIRPUS SPP., TYPHA SP., ALNUS SP., SALIX SP., AND ROSA SP. OTTER, CRAB, WOOD DUCK, GEESE, AND SWAN, OVERWINTERING. ANADROMOUS FISH, SHAD, OF HISTORIC INTEREST IS THE IRON WORKS, ESTABLISHED 1715, OPERATED UNTIL 1910. VANDALISM IS A PROBLEM IN THE AREA. 00222.2 HA 08 |
| 000000662 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 410 01 | DESCRIPTION OF AREA: AREA INCL. BUFFER ZONE: ECOLOGICAL RATING: | HOOD POINT - PINEY POINT - MARSHY CREEK MARYLAND QUEEN ANNE QUEENSTOWN, MD 00250.5 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH VEGETATION. OTTER, TERRAPIN, OSPREY, CRABS AND OYSTERS. ANADROMOUS FISH, STRIPED BASS. 08 |
| 000000663 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: ECOLOGICAL RATING: | KENT POINT MARYLAND QUEEN ANNE CLAIBORNE, MD 00072.7 HA PRIVATE POND OSPREY, CRABS, PUDDLE DUCK CONCENTRATION. ANADROMOUS FISH, STRIPED BASS. 08 |
| 000000667 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: | CABIN JOHN CREEK MARSHES MARYLAND CECIL EARLEVILLE, MD 00290.9 HA PRIVATE MARSH, FRESHWATER |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|--|--|--|--|
| 00000667 | 170 | 01 02 03 180 400 410 | BIOTIC COMPONENTS: DESCRIPTION OF AREA: AREA INCL. BUFFER ZONE: ECOLOGICAL RATING: | FRESHWATER MARSH WITH SCIRPUS SPP. OTTER. OVERWINTERING SWAN. HERONRY WITH ABOUT 150 NESTS. CRAB. ANADROMOUS FISH. IN ELK RIVER WATERSHED. 00214.1 HA 08 |
| 00000680 | 010 020 021 030 040 060 151 170 | 01 01 01 01 01 01 01 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: | LANGFORD MARSH - RICHARDSON MARSH - MARUMSLO CREEK MARYLAND SOMERSET SAXIS, MD; CRISFIELD, MD 01478.6 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. OTTER, MINK, ANADROMOUS FISH, STRIPED BASS, HERRING, WHITE SHAD. CRAB, CLAMS AND OYSTER. IN POCOMOKE RIVER WATERSHED. PRIME WETLAND 08 |
| 00000684 | 010 020 021 030 040 060 151 170 | 01 01 01 01 01 01 01 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: | HELL HOOK MARSH - WORLDS END CREEK MARYLAND DORCHESTER HONGA, MD 01607.9 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. TERRAPIN, OTTER, TURKEY, BLUE CRABS, CLAMS, OYSTERS, RUPPIA OCCIDENTALIS AND EEL GRASS. SUPERB MARSH, UNSPOILED. IMPORTANT COMMERCIAL SHELLFISH AREA. PRIME WETLAND. 02052.3 HA 08 |
| 00000688 | 010 020 021 030 040 060 151 170 | 01 01 01 01 01 01 01 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: | NUTTERS NECK MARYLAND WICOMICO WETIPQUIN, MD; MARDELLA SPRINGS, MD 00674.7 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH TYPHA SP. OTTER, ANADROMOUS FISH, STRIPED BASS, WHITE SHAD, HICKORY SHAD, ALEWIFE, CRAB. IN NANTICOKE RIVER WATERSHED. PRIME WETLAND. 08 |
| 00000699 | 010 | 01 | NAME OF AREA: | PICOWAXEN CREEK |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000699 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | COLONIAL BEACH NORTH, MD |
| | 040 | 01 | SIZE OF AREA: | 00097.0 HA |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES, MINK, OTTER, ANADROMOUS FISH, STRIPED BASS, OSPREY, IN POTOMAC RIVER WATERSHED. |
| | | 02 | | 08 |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000706 | 010 | 01 | NAME OF AREA: | CATLETT ISLANDS |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | GLOUCESTER |
| | 030 | 01 | QUADRANGLE: | CLAY BANK, VA |
| | 040 | 01 | SIZE OF AREA: | 00258.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, PINUS TAEDA, JUNIPERUS VIRGINIANA, HIGH TIDAL MARSH WITH SPARTINA ALTERNIFLORA AND JUNCUS ROEMERIANUS. OSPREY. OYSTERS. |
| | | 02 | | |
| | | 03 | | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| 00000726 | 010 | 01 | NAME OF AREA: | LILLEYS NECK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | MATHEWS |
| | 030 | 01 | QUADRANGLE: | MATHEWS, VA |
| | 040 | 01 | SIZE OF AREA: | 00105.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. UPLAND PINES, SUCCESSIONAL. OSPREY. |
| | | 02 | | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | 00117.2 HA |
| | | 01 | | 08 |
| 00000732 | 010 | 01 | NAME OF AREA: | SKELETON CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CAROLINE |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00161.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. OSPREY, OTTER, ANADROMOUS FISH, STRIPED BASS, WHITE SHAD, HICKORY SHAD, HERRING. |
| | | 02 | | |
| | | 03 | | |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. PRIME WETLAND. |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| 00000742 | 010 | 01 | NAME OF AREA: | BLINKHORN CREEK |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|------------------------------|---|
| 00000742 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00242.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH, SWAMP FOREST, TAXODIUM DISTICHUM, OSPREY, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. PRIME WETLAND. |
| | 410 | 01 | ECOLOGICAL RATING: | 08 NOTE: AREA SHOULD RECEIVE SPECIAL CONSIDERATION |
| | | | | |
| 00000753 | 010 | 01 | NAME OF AREA: | BRANT MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | STAFFORD |
| | 030 | 01 | QUADRANGLE: | WIDEWATER, VA |
| | 040 | 01 | SIZE OF AREA: | 00064.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. |
| | 191 | 01 | RARE AND ENDANGERED ANIMALS: | EAGLE NEST |
| 00000768 | 400 | 01 | AREA INCL. BUFFER ZONE: | 00153.5 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 08 |
| | | | | |
| | 010 | 01 | NAME OF AREA: | WARREN TRACT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | SURRY |
| | 030 | 01 | QUADRANGLE: | BACONS CASTLE, VA |
| | 040 | 01 | SIZE OF AREA: | 00125.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. PINUS TAEDA, PINUS VIRGINIANA, |
| 00000787 | | | | FAGUS GRANDIFOLIA, LIRIODENDRON TULIPIFERA, QUERCUS SPP., |
| | | | | ULMUS SP., CARYA GLABRA AND PLATANUS OCCIDENTALIS. |
| | | | | UNDERSTORY IS MOSTLY BEECH REPRODUCTION. |
| | | | | IN JAMES RIVER WATERSHED. FOREST HAS NOT BEEN DISTURBED |
| | | | | FOR DECADES. |
| | | | | 08 |
| | | | | |
| | 010 | 01 | NAME OF AREA: | DOLLY BOARMANS CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | COLONIAL BEACH NORTH, MD |
| | 040 | 01 | SIZE OF AREA: | 00084.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | | | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| | | | | MINK, OTTER, OSPREY, CRABS. ANADROMOUS FISH, STRIPED |
| | | | | BASS. |
| | | | | 04 |
| | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|------------------------------|--|
| 00000787 | 410 01 | ECOLOGICAL RATING: | 08 |
| 00000797 | 010 01 | NAME OF AREA: | HARNES CREEK |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | ANNE ARUNDEL |
| | 030 01 | QUADRANGLE: | SOUTH RIVER, MD |
| | 040 01 | SIZE OF AREA: | 00036.4 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 070 01 | BIOTIC COMPONENTS: | UPLAND MATURE FOREST |
| | 170 01 | DESCRIPTION OF AREA: | IN SOUTH RIVER WATERSHED. ADJACENT LAND IS |
| | 180 01 | | DENSE RESIDENTIAL AND 12 HA OF FARM LAND. |
| | 02 02 | | IRREGULAR SHORELINE WITH BAYS AND INLETS. SMALL |
| | 03 03 | | BEACH. MOSTLY WETLANDS. |
| | 04 04 | | EAGLE NEST |
| | 191 01 | RARE AND ENDANGERED ANIMALS: | ACCESS INFORMATION |
| | 200 01 | CONTENTS IN MANUAL FILE: | 08 |
| | 410 01 | ECOLOGICAL RATING: | |
| 00000617 | 010 01 | NAME OF AREA: | GOODWIN ISLANDS |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | YORK |
| | 030 01 | QUADRANGLE: | POQUOSON WEST, VA |
| | 040 01 | SIZE OF AREA: | 00169.7 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. MANY SPECIES OF SHORE |
| | 02 02 | | BIRDS. OSPREY. HARD SHELL CLAMS. |
| | 02 02 | | IN YORK RIVER WATERSHED. SALT MARSH ISLAND. |
| | 03 03 | | ABANDONED FOR PAST 40 YEARS. PREVIOUSLY SITE OF |
| | 410 01 | ECOLOGICAL RATING: | MENHADEN REDUCTION PLANT. |
| 00000624 | 010 01 | NAME OF AREA: | POHICK - ACCOTINK CREEKS, UPPER, LOWER |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | FAIRFAX |
| | 030 01 | QUADRANGLE: | ANNANDALE, VA; BELVOIR, VA |
| | 040 01 | SIZE OF AREA: | 00808.0 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 065 01 | OWNER II: | FEDERAL, MILITARY |
| | 170 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. UPLAND PINE FOREST, |
| | 02 02 | | SUCCESSIONAL. ANADROMOUS FISH, HERRING. |
| | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. |
| | 410 01 | ECOLOGICAL RATING: | 07 |
| 00000630 | 010 01 | NAME OF AREA: | CAT POINT CREEK MARSH |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | RICHMOND |
| | 030 01 | QUADRANGLE: | TAPPAHANNOCK, VA |
| | 040 01 | SIZE OF AREA: | 00686.8 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000630 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES, PANICUM VIRGATUM, HIBISCUS SP. AND TYPHA SP. OSPREY, ANADROMOUS FISH, STRIPED BASS AND HERRING. IN RAPPAHANNOCK RIVER WATERSHED. |
| | | 02 | | 02706.8 HA |
| | | 03 | | 07 |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000631 | 010 | 01 | NAME OF AREA: | CROUCHE'S CREEK - TIMBER NECK CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | SURRY |
| | 030 | 01 | QUADRANGLE: | SURRY, VA |
| | 035 | 01 | COORDINATES: | 37 10 -- N 076 47 32 W |
| | 040 | 01 | SIZE OF AREA: | 00149.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA CYNOSUROIDES, HIBISCUS SP. AND TYPHA ANGUSTIFOLIA. SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. ANADROMOUS FISH, HERRING. IN JAMES RIVER WATERSHED |
| | | 02 | | 01454.4 HA |
| | | 03 | | 07 |
| 00000638 | 010 | 01 | NAME OF AREA: | NORTH LANDING RIVER SWAMP - POCATY CREEK SWAMP |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CHESAPEAKE; VIRGINIA BEACH |
| | 030 | 01 | QUADRANGLE: | PLEASANT RIDGE, VA |
| | 040 | 01 | SIZE OF AREA: | 04516.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. LARGELY SOUTHERN FLORA AND FAUNA. |
| | | 02 | | 07 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000654 | 010 | 01 | NAME OF AREA: | GUINEA MARSHES |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | GLOUCESTER |
| | 030 | 01 | QUADRANGLE: | ACHILLES, VA; NEW POINT COMFORT, VA |
| | 040 | 01 | SIZE OF AREA: | 00395.9 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA PATENS, JUNCUS ROEMERIANUS. OCCASIONAL ISLANDS OF PINUS TAEDA. OSPREY. SUPERB MARSHES. |
| | | 02 | | 07 |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000690 | 010 | 01 | NAME OF AREA: | POINT NO POINT - PENKNIFE POINT - REDFIN CREEK |
| | 020 | 01 | STATE: | MARYLAND |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|---|
| 00000690 | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | MARDELLA SPRINGS, MD |
| | 040 | 01 | SIZE OF AREA: | 044.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. OTTER, NUTRIA, TERRAPIN, ANADROMOUS FISH, STRIPED BASS. |
| | | 02 | DESCRIPTION OF AREA: | IN NANTICOKE RIVER WATERSHED. PRIMARILY WETLANDS |
| | 180 | 01 | ECOLOGICAL RATING: | WILDLIFE HABITAT. PRIME WETLAND |
| | 410 | 01 | | 07 |
| 00000692 | 010 | 01 | NAME OF AREA: | ROUND BAY BOG |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | ROUND BAY, MD |
| | 040 | 01 | SIZE OF AREA: | 00056.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | BOG |
| | 170 | 01 | BIOTIC COMPONENTS: | VACCINIUM SP., CRANBERRY, - SPHAGNUM SP. BOG WITH ILEX SP. AND MAGNOLIA SP. WIDE VARIETY OF BIRDLIFE. |
| | | 02 | DESCRIPTION OF AREA: | IN SEVERN RIVER WATERSHED WITHIN 25 MILES OF BALTIMORE, MARYLAND AND OF WASHINGTON, D.C. NO IMMINENT PRESERVATION PROBLEMS. |
| | 180 | 01 | ECOLOGICAL RATING: | 00299.0 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 07 NOTE: BOG SHOULD RECEIVE SPECIAL CONSIDERATION |
| | 410 | 01 | | |
| 00000693 | 010 | 01 | NAME OF AREA: | HUNTING CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CAROLINE, DORCHESTER |
| | 030 | 01 | QUADRANGLE: | PRESTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00307.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. OSPREY, HAWKS, WOOD DUCKS |
| | | 02 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. |
| | 180 | 01 | ECOLOGICAL RATING: | 07 |
| | 410 | 01 | | |
| 00000697 | 010 | 01 | NAME OF AREA: | FRAZER'S LAKE |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | EARLEVILLE, MD |
| | 040 | 01 | SIZE OF AREA: | 00064.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | POND |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. OTTER, ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN ELK RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00735.3 HA |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | |
|----------|-----|----|--------------------------|
| 00000697 | 410 | 01 | ECOLOGICAL RATING: |
| 00000722 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER I: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | | 02 | |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000725 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER I: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | 400 | 01 | AREA INCL. BUFFER ZONE: |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000743 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |
| | 060 | 01 | OWNER I: |
| | 151 | 01 | AQUATIC TYPES: |
| | 170 | 01 | BIOTIC COMPONENTS: |
| | | 02 | |
| | 180 | 01 | DESCRIPTION OF AREA: |
| | | 02 | |
| | | 03 | |
| | | 04 | |
| | 200 | 01 | CONTENTS IN MANUAL FILE: |
| | 410 | 01 | ECOLOGICAL RATING: |
| 00000745 | 010 | 01 | NAME OF AREA: |
| | 020 | 01 | STATE: |
| | 021 | 01 | COUNTY: |
| | 030 | 01 | QUADRANGLE: |
| | 040 | 01 | SIZE OF AREA: |

| | |
|----|---|
| 07 | HACK CREEK |
| | VIRGINIA |
| | NORTHUMBERLAND |
| | BURGESS, VA |
| | 00642.4 HA |
| | PRIVATE |
| | UPLAND MATURE HARDWOOD. UPLAND PINES, SUCCESSIONAL |
| | ANADROMOUS FISH. PINUS SPP. - QUERCUS SPP. |
| | IN POTOMAC RIVER WATERSHED. AGRICULTURE IS PRINCIPAL |
| | LAND USE. |
| 07 | |
| | HOSKINS CREEK MARSH |
| | VIRGINIA |
| | ESSEX |
| | MOUNT LANDING, VA; TAPPAHANNOCK, VA |
| | 00367.6 HA |
| | PRIVATE |
| | MARSH, TIDAL |
| | HIGH TIDAL MARSH. SPARTINA CYNOSUROIDES. ANADROMOUS |
| | FISH, STRIPED BASS AND HERRING. OSPREY. |
| | IN TAPPAHANNOCK RIVER WATERSHED. PRIME WETLANDS. |
| | 01717.0 HA |
| 07 | |
| | CHERRYFIELD POINT |
| | MARYLAND |
| | ST. MARY'S |
| | ST. MARY'S CITY, MD |
| | 00084.8 HA |
| | PRIVATE |
| | MARSH, TIDAL |
| | HIGH TIDAL MARSH, UPLAND MATURE HARDWOODS. OSPREY. |
| | QUERCUS SPP. - PINUS SPP. SALT MEADOWS. |
| | IN POTOMAC RIVER WATERSHED. BOUNDED BY ST. MARY'S RIVER |
| | AND ST. GEORGE'S CREEK. NO IMMINENT PROBLEMS. DESCRIBED |
| | AS A "UNIQUE ECOLOGICAL AREA" IN THE REPORT OF THE |
| | POTOMAC TASK FORCE, U. S. DEPT. OF INTERIOR. |
| | GENERAL INFORMATION |
| 07 | |
| | MARSH ISLAND |
| | MARYLAND |
| | CHARLES |
| | INDIAN HEAD, MD |
| | 00012.1 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000745 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH, SCIRPUS SPP. MINK, OSPREY, CRAB. |
| | | 02 | | ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000751 | 010 | 01 | NAME OF AREA: | WHITE MARSH - SKINKERS NECK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | CAROLINE |
| | 030 | 01 | QUADRANGLE: | PORT ROYAL, VA |
| | 040 | 01 | SIZE OF AREA: | 00161.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES. SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00210.1 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000752 | 010 | 01 | NAME OF AREA: | BIG MARSH POINT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | BRANDON, VA |
| | 040 | 01 | SIZE OF AREA: | 00080.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES. OSPREY, ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHICKAHOMINY AND JAMES RIVERS WATERSHEDS. PRIME WETLANDS. |
| | 400 | 02 | AREA INCL. BUFFER ZONE: | 00092.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000758 | 010 | 01 | NAME OF AREA: | KENNON MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE GEORGE |
| | 030 | 01 | QUADRANGLE: | CHARLES CITY, VA; BRANDON, VA |
| | 040 | 01 | SIZE OF AREA: | 00266.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH COMMUNITY. OSPREY, ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00303.0 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000767 | 010 | 01 | NAME OF AREA: | TANGIER ISLAND |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | TANGIER ISLAND, VA |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|---|--|---|--|
| 00000767 | 040 060 151 170 410 | 01 01 01 02 03 01 | SIZE OF AREA; OWNER I; AQUATIC TYPES; BIOTIC COMPONENTS; ECOLOGICAL RATING; | 00270.7 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OYSTERS, CRABS, OSPREY. HARDWOOD FOREST. 07 |
| 00000775 | 010 020 021 030 040 060 151 170 180 | 01 01 01 01 01 01 01 01 01 | NAME OF AREA; STATE; COUNTY; QUADRANGLE; SIZE OF AREA; OWNER I; AQUATIC TYPES; BIOTIC COMPONENTS; DESCRIPTION OF AREA; | BREWER POND MARYLAND ANNE ARUNDEL ROUND BAY, MD 00408.0 HA PRIVATE POND UPLAND MATURE HARDWOODS. OVERWINTERING SWAN. LOCATED ON SOUTH BANK OF SEVERN RIVER JUST UPSTREAM FROM SHERWOOD FOREST RESIDENTIAL DEVELOPMENT. SHORELINE OF POND, IRREGULAR, SMALL WETLAND AREAS. NARROW BEACH. 00137.4 HA 07 |
| 00000782 | 010 020 021 030 040 060 151 170 180 400 410 | 01 01 01 01 01 01 01 01 01 01 | NAME OF AREA; STATE; COUNTY; QUADRANGLE; SIZE OF AREA; OWNER I; AQUATIC TYPES; BIOTIC COMPONENTS; DESCRIPTION OF AREA; AREA INCL. BUFFER ZONE; ECOLOGICAL RATING; | POPES CREEK MARYLAND CHARLES POPES CREEK, MD 00097.0 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. SPARTINA CYNOSUROIDES. OTTER, OSPREY, MUSKRAT AND CRABS. ANADROMOUS FISH, STRIPED BASS. ABANDONED RAILROAD ALONG NORTHERN EDGE MAKES GOOD ACCESS. IN POTOMAC RIVER WATERSHED. LOCATED NEAR POPES CREEK GEOLOGIC SECTION. 00533.3 HA 07 |
| 00000788 | 010 020 021 030 040 060 151 170 | 01 01 01 01 01 01 01 01 | NAME OF AREA; STATE; COUNTY; QUADRANGLE; SIZE OF AREA; OWNER I; AQUATIC TYPES; BIOTIC COMPONENTS; | KITT POINT MARYLAND CALVERT BROOKES ISLAND, MD 00040.4 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OSPREY, MINK - OTTER, CANVASBACK DUCKS AND CRABS. |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000788 | 180 | 01 | DESCRIPTION OF AREA: | IN PATUXENT RIVER WATERSHED. 00137.4 HA 07 |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| 00000790 | 010 | 01 | NAME OF AREA: | LONG COVE CALVERT BROOMES ISLAND, MD 00088.9 HA PRIVATE HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OTTER, OSPREY AND CRABS. IN PATUXENT RIVER WATERSHED. 00456.5 HA 07 |
| | 021 | 01 | COUNTY: | |
| | 030 | 01 | QUADRANGLE: | |
| | 040 | 01 | SIZE OF AREA: | |
| | 060 | 01 | OWNER I: | |
| | 170 | 01 | BIOTIC COMPONENTS: | |
| | | 02 | | |
| | | 03 | | |
| 00000792 | 180 | 01 | DESCRIPTION OF AREA: | POND CREEK MARYLAND CECIL EARLEVILLE, MD; SPESUTIE, MD 00379.8 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH SCIRPUS SPP. OTTER, CLAMS AND OVERWINTERING GEESE. ANADROMOUS FISH. IN ELK RIVER WATERSHED. 00820.1 HA 07 |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| | | | | |
| | 010 | 01 | NAME OF AREA: | |
| | 020 | 01 | STATE: | |
| | 021 | 01 | COUNTY: | |
| | 030 | 01 | QUADRANGLE: | |
| 00000793 | 040 | 01 | SIZE OF AREA: | PISCATAWAY CREEK MARYLAND PRINCE GEORGES PISCATAWAY, MD; MT. VERNON, VA 00646.4 HA PRIVATE MARSH, FRESHWATER FRESHWATER MARSH WITH TYPHA SP. MINK, OTTER AND WOOD DUCK. ANADROMOUS FISH. HERRING. IN POTOMAC RIVER WATERSHED. 07 |
| | 060 | 01 | OWNER I: | |
| | 151 | 01 | AQUATIC TYPES: | |
| | 170 | 01 | BIOTIC COMPONENTS: | |
| | | 02 | | |
| | 180 | 01 | DESCRIPTION OF AREA: | |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000826 | 010 | 01 | NAME OF AREA: | MUDDY CREEK MARYLAND ANNE ARUNDEL SOUTH RIVER, MD; DEALE, MD 00222.2 HA SMITHSONIAN INSTITUTION PRIVATE |
| | 020 | 01 | STATE: | |
| | 021 | 01 | COUNTY: | |
| | 030 | 01 | QUADRANGLE: | |
| | 040 | 01 | SIZE OF AREA: | |
| | 060 | 01 | OWNER I: | |
| | 065 | 01 | OWNER II: | |
| | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-----------------------------|---|
| 00000826 | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. ANADROMOUS FISH, OTTER, MINK, ALEWIVES, |
| | | 02 | | CRAB, CLAMS, OYSTER. |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000832 | 010 | 01 | NAME OF AREA: | CHIPPOKES CREEK MARSH, LOWER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | SURRY |
| | 030 | 01 | QUADRANGLE: | HOG ISLAND, VA; BACONS CASTLE, VA |
| | 040 | 01 | SIZE OF AREA: | 00242.4 HA |
| | 060 | 01 | OWNER I: | STATE OF VIRGINIA PARKS COMMISSION |
| | 065 | 01 | OWNER II: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. ANADROMOUS FISH. |
| | 190 | 01 | RARE AND ENDANGERED PLANTS: | EUPATORIUM SALTUENSE |
| | 410 | 01 | ECOLOGICAL RATING: | 07 |
| 00000611 | 010 | 01 | NAME OF AREA: | COLLEGE CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | JAMES CITY |
| | 030 | 01 | QUADRANGLE: | HOG ISLAND, VA; WILLIAMSBURG, VA |
| | 040 | 01 | SIZE OF AREA: | 00521.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 065 | 01 | OWNER II: | FEDERAL, AGENCY |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. HERONRY. |
| | 180 | 01 | DESCRIPTION OF AREA: | ANADROMOUS FISH, HERRING RUN. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | IN JAMES RIVER WATERSHED. HEAVY DISTURBANCE. |
| | 410 | 01 | ECOLOGICAL RATING: | 02109.9 HA 06 |
| 00000623 | 010 | 01 | NAME OF AREA: | NEABSCO CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE WILLIAM |
| | 030 | 01 | QUADRANGLE: | QUANTICO, VA; INDIAN HEAD, VA |
| | 040 | 01 | SIZE OF AREA: | 00339.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | ANADROMOUS FISH. DOMINANT PLANT SPECIES ARE ZIZANIA |
| | 180 | 02 | DESCRIPTION OF AREA: | SP., TYPHA SP., PONTEDERIA SP. AND POLYGONUM SP. |
| | | 02 | | IN POTOMAC RIVER WATERSHED. THE DISTRICT OF COLUMBIA |
| | | 03 | | WISHES TO FILL AREA WITH REFUSE AND BUILD A SEWAGE |
| 00000628 | 200 | 01 | CONTENTS IN MANUAL FILE: | PLANT AND MARINA. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | LOCATION MAP |
| | 410 | 01 | ECOLOGICAL RATING: | 01171.6 HA 06 |
| | 010 | 01 | NAME OF AREA: | QUANTICO CREEK |
| | | | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000628 | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE WILLIAM |
| | 040 | 01 | SIZE OF AREA: | 00464.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH VEGETATION. ANADROMOUS FISH, HERRING. |
| | | 02 | | IN POTOMAC RIVER WATERSHED. |
| | 180 | 01 | DESCRIPTION OF AREA: | 01373.6 HA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 06 |
| | 410 | 01 | ECOLOGICAL RATING: | |
| 00000647 | 010 | 01 | NAME OF AREA: | HYSLOP MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | JAMESVILLE, VA; NANDUA CREEK, VA |
| | 040 | 01 | SIZE OF AREA: | 00416.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. OSPREY. |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLAND. |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000650 | 010 | 01 | NAME OF AREA: | WINTER HARBOR MARSH - GARDEN CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | MATHEWS |
| | 030 | 01 | QUADRANGLE: | MATHEWS, VA; NEW POINT COMFORT, VA |
| | 040 | 01 | SIZE OF AREA: | 00545.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. OSPREY. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00597.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000651 | 010 | 01 | NAME OF AREA: | COHOKE MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | NEW KENT, VA |
| | 040 | 01 | SIZE OF AREA: | 00331.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | PRIME WETLAND. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00420.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000654 | 010 | 01 | NAME OF AREA: | RED POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | NORTH EAST, MD |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000664 | 040 | 01 | SIZE OF AREA: | 00109.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE - BOY SCOUTS |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, ANADROMOUS FISH, HERRING, |
| | | 02 | | SHAD, STRIPED BASS, CRABS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00428.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000671 | 010 | 01 | NAME OF AREA: | ELK RIVER |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | ELKTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00460.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. AND TYPHA SP. |
| | | 02 | | ANADROMOUS FISH, SHAD, CRABS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN ELK RIVER WATERSHED |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00832.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000676 | 010 | 01 | NAME OF AREA: | HARBOR COVE-LOWES POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | TALBOT |
| | 030 | 01 | QUADRANGLE: | NORTH BEACH, MD |
| | 040 | 01 | SIZE OF AREA: | 00068.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH, OSPREY, ANADROMOUS FISH, STRIPED |
| | | 02 | | BASS |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000696 | 010 | 01 | NAME OF AREA: | CYPRESS BRANCH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | KENT |
| | 030 | 01 | QUADRANGLE: | MILLINGTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00328.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, TAXODIUM DISTICHUM, CHAMAECYPARIS |
| | | 02 | | THYOIDES, WOOD DUCK, |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01644.3 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000698 | 010 | 01 | NAME OF AREA: | MEDLEY CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 030 | 01 | QUADRANGLE: | ST. CLEMENTS, MD |
| | 040 | 01 | SIZE OF AREA: | 00052.5 HA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000698 | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. AND TYPHA SP. |
| | | 02 | | OYSTER, CLAM, CRAB, OSPREY. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000704 | 010 | 01 | NAME OF AREA: | WARWICK RIVER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEWPORT NEWS |
| | 030 | 01 | QUADRANGLE: | MULBERRY ISLAND, VA |
| | 040 | 01 | SIZE OF AREA: | 00686.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | | 02 | | ALTERNIFLORA AND SPARTINA CYNOSUROIDES. OYSTERS. |
| | 180 | 01 | DESCRIPTION OF AREA: | JAMES RIVER WATERSHED. AREA BEING ENCRONCHED BY |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000705 | 010 | 01 | NAME OF AREA: | BROOKS CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | KING AND QUEEN COURTHOUSE, VA |
| | 040 | 01 | SIZE OF AREA: | 00404.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST. ANADROMOUS FISH, HERRING AND STRIPED |
| | | 02 | | BASS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN YORK RIVER WATERSHED. PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 02383.6 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000709 | 010 | 01 | NAME OF AREA: | AQUIA CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | STAFFORD |
| | 030 | 01 | QUADRANGLE: | STAFFORD, VA |
| | 040 | 01 | SIZE OF AREA: | WIDEWATER, VA |
| | 060 | 01 | OWNER I: | 00355.5 HA |
| | 151 | 01 | AQUATIC TYPES: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | MARSH, FRESHWATER |
| | | 02 | | ANADROMOUS FISH, HERRING. NELUMBO SP. (LOTUS LILY) |
| | 180 | 01 | DESCRIPTION OF AREA: | MARSH. |
| | | 02 | | IN POTOMAC RIVER WATERSHED. UPPER END OF AQUIA |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | CREEK. EXCELLENT MARSH AND WETLANDS AREA. <u>NOW BEING</u> |
| | 410 | 01 | ECOLOGICAL RATING: | DEVELOPED. |
| | | 03 | | 02007.9 HA |
| | | 01 | | 06 |
| 00000718 | 010 | 01 | NAME OF AREA: | CHARLES NECK SWAMP |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000718 | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | HENRICO |
| | 030 | 01 | QUADRANGLE: | HOPEWELL, VA |
| | 040 | 01 | SIZE OF AREA: | 00580.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS AND TAXODIUM DISTICHUM. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. NEAR MEADOWVIEW REGIONAL |
| | | 02 | | PARK GRAVEL DREDGING OPERATIONS IN AREA. PRIME |
| | | 03 | | WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00626.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000723 | 010 | 01 | NAME OF AREA: | HALL TRACT |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NORTHUMBERLAND |
| | 030 | 01 | QUADRANGLE: | FLEETS BAY, VA |
| | 035 | 01 | COORDINATES: | 37 41 -- N 076 18 30 W |
| | 040 | 01 | SIZE OF AREA: | 00262.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; POND |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, |
| | | 02 | | DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OYSTER BEDS. |
| | | 03 | | GREAT BLUE HERONS. EGRETS. |
| | 180 | 01 | DESCRIPTION OF AREA: | INCLUDES SOME FARMLAND AND TIMBER LAND. AREA IS |
| | | 02 | | RELATIVELY INACCESSIBLE. |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000731 | 010 | 01 | NAME OF AREA: | SCOTCHMAN CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | EARLEVILLE, MD |
| | 040 | 01 | SIZE OF AREA: | 00187.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. OTTER, SWAN, |
| | | 02 | | ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN ELK RIVER WATERSHED. PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00597.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000734 | 010 | 01 | NAME OF AREA: | THORN GUT MARSH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | WIDEWATER, MD; NANJEMOY, MD |
| | 040 | 01 | SIZE OF AREA: | 00072.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. MINK, OTTER, OYSTER, |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|-------------------------|--|
| 00000734 | 170 02 | | CRAB. |
| | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED |
| | 410 01 | ECOLOGICAL RATING: | 06 |
| 00000740 | 010 01 | NAME OF AREA: | ANDOVER BRANCH |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | QUEEN ANNE |
| | 030 01 | QUADRANGLE: | SUDLERSVILLE, MD |
| | 040 01 | SIZE OF AREA: | 00141.4 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | SWAMP |
| | 170 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS, CHAMAECYPARIS THYOIDES. |
| | 02 | | WOOD DUCK. |
| | 180 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED |
| 00000741 | 410 01 | ECOLOGICAL RATING: | 06 NOTE: AREA SHOULD RECEIVE SPECIAL CONSIDERATION |
| | 010 01 | NAME OF AREA: | BERRY RUN - BELL CREEK |
| | 020 01 | STATE: | MARYLAND |
| 00000741 | 021 01 | COUNTY: | CAROLINE |
| | 030 01 | QUADRANGLE: | FOWLING CREEK, MD |
| | 040 01 | SIZE OF AREA: | 00121.2 HA |
| | 151 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. AND SCIRPUS SPP. |
| | 02 | | OTTER, ANADROMOUS FISH, STRIPED BASS, WHITE SHAD, |
| | 03 | | HICKORY SHAD, HERRING. |
| 00000757 | 180 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. PRIME WETLAND. |
| | 410 01 | ECOLOGICAL RATING: | 06 |
| | 010 01 | NAME OF AREA: | DAMERON MARSH |
| 00000757 | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | NORTHUMBERLAND |
| | 030 01 | QUADRANGLE: | REEDVILLE, VA |
| | 040 01 | SIZE OF AREA: | 00088.9 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| 00000762 | 180 01 | DESCRIPTION OF AREA: | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OSPREY. |
| | 400 01 | AREA INCL. BUFFER ZONE: | PRIME WETLANDS. |
| | 410 01 | ECOLOGICAL RATING: | 00097.0 HA |
| 00000762 | 010 01 | NAME OF AREA: | PAYNES ISLAND MARSHES |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | ESSEX |
| | 030 01 | QUADRANGLE: | CHAMPLAIN, VA |
| | 040 01 | SIZE OF AREA: | 00670.8 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 02 | | |
| | 01 | | |
| | 01 | | |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|-------------------------|--|
| 00000762 | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | 02 | | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| | 03 | | ANADROMOUS FISH. |
| | 180 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED. PRIME WETLAND. |
| 00000763 | 400 01 | AREA INCL. BUFFER ZONE: | 00795.9 HA |
| | 410 01 | ECOLOGICAL RATING: | 06 |
| | 010 01 | NAME OF AREA: | RIGBY ISLAND |
| | 020 01 | STATE: | VIRGINIA |
| 00000769 | 021 01 | COUNTY: | MATHEWS |
| | 030 01 | QUADRANGLE: | MATHEWS, VA |
| | 040 01 | SIZE OF AREA: | 00048.5 HA |
| | 060 01 | OWNER I: | PRIVATE |
| 00000805 | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | 180 01 | DESCRIPTION OF AREA: | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OSPREY. |
| | 410 01 | ECOLOGICAL RATING: | SANDY BEACH. 06 |
| 00000805 | 010 01 | NAME OF AREA: | LYONS CREEK |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | ANNE ARUNDEL |
| | 030 01 | QUADRANGLE: | DEAL, MD |
| 00000812 | 040 01 | SIZE OF AREA: | 00307.0 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 170 01 | BIOTIC COMPONENTS: | SWAMP FOREST, HARDWOODS. NESTING WOOD DUCKS. MINK. |
| | 180 01 | DESCRIPTION OF AREA: | HAWKS. |
| 00000812 | 400 01 | AREA INCL. BUFFER ZONE: | IN PATUXENT RIVER WATERSHED. |
| | 410 01 | ECOLOGICAL RATING: | 01082.7 HA 06 |
| | 010 01 | NAME OF AREA: | NEWTOWN NECK |
| | 020 01 | STATE: | MARYLAND |
| 00000812 | 021 01 | COUNTY: | ST. MARY'S |
| | 030 01 | QUADRANGLE: | ST. CLEMENTS ISLAND, MD; LEONARDTOWN, MD |
| | 040 01 | SIZE OF AREA: | 00331.3 HA |
| | 170 01 | BIOTIC COMPONENTS: | UPLAND MATURE FOREST. OSPREY. |
| 00000812 | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. SIGNIFICANT FOR ITS HISTORICAL. |
| | 020 01 | NAME OF AREA: | NATURAL AND RECREATIONAL VALUES. 80.8 HA PLANNED FOR A GOLF |
| | 021 01 | STATE: | COURSE. REST OF AREA WILL PROBABLY BE DEVELOPED RESIDENTIALLY. |
| | 030 01 | QUADRANGLE: | 06 |
| 00000812 | 040 01 | SIZE OF AREA: | HEMLOCK STAND ON MILL CREEK |
| | 060 01 | OWNER I: | MARYLAND |
| | 021 01 | COUNTY: | CAROLINE |
| | 030 01 | QUADRANGLE: | HOBBS, MD |
| 00000812 | 040 01 | SIZE OF AREA: | 00016.2 HA |
| | 060 01 | OWNER I: | PRIVATE |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000812 | 151 | 01 | AQUATIC TYPES: | SWAMP |
| | 170 | 01 | BIOTIC COMPONENTS: | SWAMP FOREST HARDWOODS. TSUGA CANADENSIS, |
| | | 02 | | OCCURRING OUTSIDE ITS COASTAL PLAIN RANGE. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED |
| | 410 | 01 | ECOLOGICAL RATING: | 06 NOTE: AREA SHOULD RECEIVE SPECIAL CONSIDERATION |
| 00000824 | 010 | 01 | NAME OF AREA: | PEARCE CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | EARLEVILLE, MD |
| | 040 | 01 | SIZE OF AREA: | 01770.5 HA |
| | 060 | 01 | OWNER I: | CORP OF ENGINEERS |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. GEESE. ANADROMOUS FISH. |
| | 410 | 01 | ECOLOGICAL RATING: | 06 |
| 00000604 | 010 | 01 | NAME OF AREA: | MULBERRY ISLAND |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NEWPORT NEWS CITY |
| | 030 | 01 | QUADRANGLE: | MULBERRY ISLAND, VA |
| | 040 | 01 | SIZE OF AREA: | 00404.0 HA |
| | 060 | 01 | OWNER I: | FEDERAL |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. UPLAND PINE, SUCCESSIONAL. OYSTERS. |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000642 | 010 | 01 | NAME OF AREA: | BYRDS MARSH - PARKSLEY MARSHES |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | PARKSLEY, VA |
| | 040 | 01 | SIZE OF AREA: | 05615.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000646 | 010 | 01 | NAME OF AREA: | SWEET HALL MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING WILLIAM |
| | 030 | 01 | QUADRANGLE: | NEW KENT, VA |
| | 040 | 01 | SIZE OF AREA: | 00444.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. OTTER. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PAMUNKEY AND YORK RIVERS WATERSHEDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00537.3 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000649 | 010 | 01 | NAME OF AREA: | PAGAN RIVER MARSH |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000649 | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ISLE OF WIGHT |
| | 030 | 01 | QUADRANGLE: | MULBERRY ISLAND, VA; BENNS CHURCH, VA |
| | 040 | 01 | SIZE OF AREA: | 00315.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH SPARTINA ALTERNIFLORA, SPARTINA CYNOSUROIDES, IVA SP. AND BACCHARIS SP. |
| | 180 | 02 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00614.1 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000655 | 010 | 01 | NAME OF AREA: | LAWNES CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ISLE OF WIGHT; SURRY |
| | 030 | 01 | QUADRANGLE: | BACONS CASTLE, VA; HOG ISLAND, VA |
| | 040 | 01 | SIZE OF AREA: | 00438.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH VEGETATION. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. PRIME WETLAND. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01706.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000694 | 010 | 01 | NAME OF AREA: | PARKER CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | PRINCE FREDERICK, MD |
| | 040 | 01 | SIZE OF AREA: | 00218.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER; STREAM |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. OTTER. |
| | 180 | 01 | DESCRIPTION OF AREA: | SPARSELY DEVELOPED AREA. TOBACCO FIELDS INTERMINGLED IN THE WOODLAND. TOPOGRAPHY IS SHARPLY ROLLING. |
| | 400 | 03 | AREA INCL. BUFFER ZONE: | HIGH BANKS ALONG CREEK. |
| | 410 | 01 | ECOLOGICAL RATING: | 01636.2 HA |
| | | | | 05 |
| 00000712 | 010 | 01 | NAME OF AREA: | UPPER MACHODOC CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING GOERGE |
| | 030 | 01 | QUADRANGLE: | DAHLGREN, VA |
| | 040 | 01 | SIZE OF AREA: | 00278.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. SPARTINA CYNOSUROIDES. ANADROMOUS FISH. OYSTERS. |
| | 400 | 02 | AREA INCL. BUFFER ZONE: | 01805.9 HA |
| | | | | 05 |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

00000712 410 01 ECOLOGICAL RATING:

00000716 010 01 NAME OF AREA:

020 01 STATE:

021 01 COUNTY:

030 01 QUADRANGLE:

040 01 SIZE OF AREA:

060 01 OWNER I:

151 01 AQUATIC TYPES:

170 01 BIOTIC COMPONENTS:

03 ECOLOGICAL RATING:

00000721 010 01 NAME OF AREA:

020 01 STATE:

021 01 COUNTY:

030 01 QUADRANGLE:

040 01 SIZE OF AREA:

060 01 OWNER I:

151 01 AQUATIC TYPES:

170 01 BIOTIC COMPONENTS:

02 AREA INCL. BUFFER ZONE:

400 01 ECOLOGICAL RATING:

00000727 010 01 NAME OF AREA:

020 01 STATE:

021 01 COUNTY:

030 01 QUADRANGLE:

040 01 SIZE OF AREA:

060 01 OWNER I:

151 01 AQUATIC TYPES:

170 01 BIOTIC COMPONENTS:

03 ECOLOGICAL RATING:

00000729 010 01 NAME OF AREA:

020 01 STATE:

021 01 COUNTY:

030 01 QUADRANGLE:

040 01 SIZE OF AREA:

060 01 OWNER I:

151 01 AQUATIC TYPES:

170 01 BIOTIC COMPONENTS:

02 DESCRIPTION OF AREA:

05

BLACKWALNUT RIDGE - COW ISLAND

VIRGINIA

YORK

POQUOSON EAST, VA; HAMPTON, VA

00686.8 HA

PRIVATE

MARSH, TIDAL

HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA

PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. HARD

SHELL CLAMS.

05

GLEASON MARSH

VIRGINIA

KING AND QUEEN

KING AND QUEEN COURTHOUSE, VA; TRUMART, VA

00400.0 HA

PRIVATE

MARSH, FRESHWATER

FRESHWATER MARSH SPECIES. SWAMP FOREST. ANADROMOUS

FISH.

00933.4 HA

05

MOSQUITO ISLAND

VIRGINIA

LANCASTER

DELTAVILLE, VA

00040.4 HA

PRIVATE

MARSH, TIDAL

HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS.

DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OYSTERS. FIVE

OSPREY NESTS.

05

POWELL CREEK

VIRGINIA

PRINCE GEORGE

WESTOVER, VA

00303.8 HA

PRIVATE

MARSH, FRESHWATER

FRESHWATER MARSH SPECIES. ANADROMOUS FISH, STRIPED

BASS AND HERRING.

PRIME WETLANDS.

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000729 | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | 01575.6 HA 05 |
| 00000730 | 010 | 01 | NAME OF AREA: | RAGGED ISLAND - BALLARD MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ISLE OF WIGHT |
| | 030 | 01 | QUADRANGLE: | BENNS CHURCH, VA; NEWPORT NEWS SOUTH, VA |
| | 040 | 01 | SIZE OF AREA: | 00973.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OYSTERS. |
| | 400 | 02 | AREA INCL. BUFFER ZONE: | 01268.6 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000738 | 010 | 01 | NAME OF AREA: | MAYO POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | SOUTH RIVER, MD |
| | 040 | 01 | SIZE OF AREA: | 00040.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE HARDWOODS. SALT MEADOWS. OVERWINTERING SWAN. |
| | 180 | 01 | DESCRIPTION OF AREA: | ON SOUTH RIVER. EAST SHORE HAS SOME BLUFF AND VIRTUALLY NO BEACH, EROSION IS HIGH. NORTH SHORE HAS NARROW BEACH. MOSTLY UNDEVELOPED FOREST AND WETLANDS. SURROUNDING AREA IS URBANIZED. NOT ACCESSIBLE BY ROAD. |
| | 400 | 02 | AREA INCL. BUFFER ZONE: | 05 |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000739 | 010 | 01 | NAME OF AREA: | POPLAR POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | SOUTH RIVER, MD |
| | 040 | 01 | SIZE OF AREA: | 00052.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND MATURE FOREST. OVERWINTERING SWAN. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN SOUTH RIVER WATERSHED UNDEVELOPED FOREST LAND. NARROW SAND BEACH ALONG CHURCH CREEK. ADJACENT LAND IS MOSTLY AGRICULTURAL. |
| | 400 | 02 | AREA INCL. BUFFER ZONE: | 05 |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000744 | 010 | 01 | NAME OF AREA: | HIGGINS POND |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | EAST NEW MARKET, MD |
| | 040 | 01 | SIZE OF AREA: | 00068.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | POND; MARSH; FRESHWATER |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000744 | 170 | 01 | BIOTIC COMPONENTS: | ABUNDANT CRAPPIE, BLUEGILLS, BASS AND CATFISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. ONE OF THE LARGEST PONDS |
| | | 02 | | IN MARYLAND, IS FOR SALE. AVERAGE DEPTH OF POND IS 1 M |
| | | 03 | | MAXIMUM DEPTH IS 6 M. POND IS SURROUNDED BY SHALLOW |
| | | 04 | | MARSH. NO PERMANENT PRESERVATION IN EFFECT. |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000747 | 010 | 01 | NAME OF AREA: | SOUTHEAST CREEK - BROWNS BRANCH |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | QUEEN ANNES |
| | 030 | 01 | QUADRANGLE: | CHESTERTOWN, MD; CHURCH HILL, MD |
| | 040 | 01 | SIZE OF AREA: | 00238.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. DIVING DUCKS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED. PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00824.2 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000749 | 010 | 01 | NAME OF AREA: | DUNDEE CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | BALTIMORE |
| | 030 | 01 | QUADRANGLE: | GUNPOWDER NECK, MD |
| | 040 | 01 | SIZE OF AREA: | 00109.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. MARSH GRASS AND |
| | | 02 | | LIQUIDAMBAR STYRACIFLUA. HARDWOODS. |
| | 180 | 01 | DESCRIPTION OF AREA: | SHORE SLOPE IS GENTLE AND EROSION IS LOW. WATER |
| | | 02 | | CLARITY IS GOOD. BACKLAND TOPOGRAPHY. FLAT. STATE |
| | | 03 | | PARK ON NORTH END. SHORE IS NARROW WETLANDS BACKED |
| | | 04 | | BY UPLAND HARDWOODS. PRIME WETLANDS. |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000756 | 010 | 01 | NAME OF AREA: | CORBINS NECK - MOSS NECK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | KING GEORGE; CAROLINE |
| | 030 | 01 | QUADRANGLE: | RAPPAHANNOCK ACADEMY, VA |
| | 040 | 01 | SIZE OF AREA: | 00371.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH COMMUNITY. ANADROMOUS FISH. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED. PRIME WETLANDS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00565.6 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000759 | 010 | 01 | NAME OF AREA: | NOMINI CLIFFS |
| | 020 | 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|--|--|--|
| 00000759 | 021 01 030 01 040 01 060 01 170 01 180 01 410 01 | COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: BIOTIC COMPONENTS: DESCRIPTION OF AREA: ECOLOGICAL RATING: | WESTMORELAND STRATFORD HALL, VA 00149.5 HA PRIVATE OSPREY HIGH CLIFFS OVERLOOKING POTOMAC RIVER. IN POTOMAC RIVER WATERSHED. IMPRESSIVE LANDMARK. 05 |
| 00000760 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: ECOLOGICAL RATING: | NORTH POINT MARSH VIRGINIA LANCASTER FLEETS BAY, VA 00113.1 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OSPREY. 05 |
| 00000796 | 010 01 020 01 021 01 030 01 040 01 060 01 170 01 180 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: BIOTIC COMPONENTS: DESCRIPTION OF AREA: ECOLOGICAL RATING: | CEDAR POINT MARYLAND ANNE ARUNDEL SOUTH RIVER, MD 00040.4 HA PRIVATE UPLAND MATURE FOREST. OSPREY. LOCATED ON SOUTH SHORE OF THE SOUTH RIVER BETWEEN GLEBE BAY AND BREWER CREEK. MOSTLY UNDEVELOPED. PENINSULA. ADJACENT LAND IS DENSE RESIDENTIAL ZONE. SHORELINE IS IRREGULAR WITH SEVERAL COVES AND INLETS 05 |
| 00000817 | 010 01 020 01 021 01 030 01 040 01 060 01 151 01 170 01 180 01 410 01 | NAME OF AREA: STATE: COUNTY: QUADRANGLE: SIZE OF AREA: OWNER I: AQUATIC TYPES: BIOTIC COMPONENTS: DESCRIPTION OF AREA: ECOLOGICAL RATING: | STUMP POINT MARYLAND WICOMICO DEAL ISLAND, MD 00266.6 HA PRIVATE MARSH, TIDAL HIGH TIDAL MARSH AT MOUTH OF WICOMICO RIVER. EXCELLENT HABITAT FOR MIGRATORY WATERFOWL. IN WICOMICO RIVER WATERSHED. NO IMMINENT PRESERVATION PROBLEMS. PRIME WETLANDS. 05 |
| 00000823 | 010 01 | NAME OF AREA: | GUNPOWDER FALLS, LOWER |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|---|
| 00000823 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | HARFORD; BALTIMORE |
| | 030 | 01 | QUADRANGLE: | WHITE MARSH, MD; EDGEWOOD, MD |
| | 040 | 01 | SIZE OF AREA: | 00606.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | TIDAL MARSH. PRIME WETLANDS. |
| | 410 | 01 | ECOLOGICAL RATING: | 05 |
| 00000625 | 010 | 01 | NAME OF AREA: | POWELLS CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE WILLIAM |
| | 030 | 01 | QUADRANGLE: | QUANTICO, VA |
| | 040 | 01 | SIZE OF AREA: | 00272.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | ANADROMOUS FISH, HERRING. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01676.6 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000648 | 010 | 01 | NAME OF AREA: | MOUNT LANDING CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ESSEX |
| | 030 | 01 | QUADRANGLE: | MOUNT LANDING, VA |
| | 040 | 01 | SIZE OF AREA: | 00363.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH WITH A FINE STAND OF SPARTINA |
| | | 02 | | CYNOSUROIDES. ANADROMOUS FISH, HERRING, STRIPED |
| | | 03 | | BASS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN RAPPAHANNOCK RIVER WATERSHED |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01090.8 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000702 | 010 | 01 | NAME OF AREA: | LONG CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | HAMPTON |
| | 030 | 01 | QUADRANGLE: | HAMPTON, VA |
| | 040 | 01 | SIZE OF AREA: | 00432.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HARD SHELL CLAMS |
| | 180 | 01 | DESCRIPTION OF AREA: | SANDY BEACH |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000708 | 010 | 01 | NAME OF AREA: | HOFFLER CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|-------------------------|--|
| 00000708 | 021 | 01 | COUNTY: | NANSEMOND; PORTSMOUTH |
| | 030 | 01 | QUADRANGLE: | NEWPORT NEWS SOUTH, VA |
| | 040 | 01 | SIZE OF AREA: | 00072.7 HA |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS, |
| | | 02 | | DISTICHLIS SP. AND JUNCUS ROEMERIANUS. OYSTERS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00343.4 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000715 | 010 | 01 | NAME OF AREA: | NANSEMOND RIVER |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | NANSEMOND |
| | 030 | 01 | QUADRANGLE: | CHUCKATUCK, VA |
| | 040 | 01 | SIZE OF AREA: | 01337.2 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | TIDAL MARSH, HIGH. SPARTINA CYNOSUROIDES. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 02735.1 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000737 | 010 | 01 | NAME OF AREA: | GIBSON ISLAND |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | GIBSON ISLAND, MD |
| | 040 | 01 | SIZE OF AREA: | 00048.5 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. WHISTLING SWAN. |
| | 180 | 01 | DESCRIPTION OF AREA: | SHORELINE, HIGHLY IRREGULAR WITH WETLANDS ALONG EDGE. |
| | | 02 | | 75 PERCENT OF ISLAND IS RAPIDLY BEING DEVELOPED |
| | | 03 | | RESIDENTIALLY. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00687.0 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000750 | 010 | 01 | NAME OF AREA: | WARDS CREEK |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | PRINCE GEORGE |
| | 030 | 01 | QUADRANGLE: | CHARLES CITY, VA; SAVEDGE, VA |
| | 040 | 01 | SIZE OF AREA: | 00323.2 HA |
| | 060 | 01 | OWNER 1: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH SPECIES. ANADROMOUS FISH, STRIPED |
| | | 02 | | BASS AND HERRING. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN JAMES RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 01567.5 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000754 | 010 | 01 | NAME OF AREA: | BUSH POINT MARSH |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|--|
| 00000754 | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | GLOUCESTER |
| | 030 | 01 | QUADRANGLE: | ACHILLES, VA |
| | 040 | 01 | SIZE OF AREA: | 00134.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL; POND |
| | 170 | 01 | BIOTIC COMPONENTS: | SALT MARSH COMMUNITY |
| | 180 | 01 | DESCRIPTION OF AREA: | ON SEVERN RIVER |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00166.4 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000761 | 010 | 01 | NAME OF AREA: | PITTS CREEK MARSH |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | SAXIS, VA; HALLWOOD, VA |
| | 040 | 01 | SIZE OF AREA: | 00464.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | 410 | 02 | ECOLOGICAL RATING: | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| 00000764 | 010 | 01 | NAME OF AREA: | WEST POINT - FINNEYS ISLAND - PARKERS ISLAND - |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | ACCOMACK |
| | 030 | 01 | QUADRANGLE: | PUNGOTEAGUE, VA |
| | 040 | 01 | SIZE OF AREA: | 00282.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA |
| | 180 | 01 | DESCRIPTION OF AREA: | PATENS, DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | PRIME WETLANDS. |
| | 410 | 01 | ECOLOGICAL RATING: | 00424.2 HA |
| 00000774 | 010 | 01 | NAME OF AREA: | BEARDS CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | SOUTH RIVER, MD |
| | 040 | 01 | SIZE OF AREA: | 00149.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH TYPHA SP. CRABS. CLAMS. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN SOUTH RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | 00593.9 HA |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000798 | 010 | 01 | NAME OF AREA: | CALVERT CLIFFS |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

SERIAL CATEG LINE CAT-DEFINITION

DATA

| | | | | |
|----------|-----|----|----------------------|--|
| 00000798 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | COVE POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00101.0 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | STEEP BANKS UP TO 23 M |
| | 180 | 01 | DESCRIPTION OF AREA: | FOSSILS. GEOLOGICAL FORMATIONS. |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000799 | 010 | 01 | NAME OF AREA: | CORNFIELD POINT GEOLOGIC SECTION |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | PT. LOOKOUT, MD |
| | 040 | 01 | SIZE OF AREA: | 00048.5 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 180 | 01 | DESCRIPTION OF AREA: | FOSSILS. BLUFFS ALONG POTOMAC RIVER. EXPOSURE OF |
| | 410 | 01 | ECOLOGICAL RATING: | PLEISTOCENE AGE CLAY. MARINE MULLUSCAN SHELLS. |
| 00000801 | 010 | 01 | NAME OF AREA: | GARRETT ISLAND |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CECIL |
| | 030 | 01 | QUADRANGLE: | HAVRE DE GRACE, MD |
| | 040 | 01 | SIZE OF AREA: | 00072.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND HARDWOODS. ANADROMOUS FISH. |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000803 | 010 | 01 | NAME OF AREA: | JACK BAY |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CALVERT |
| | 030 | 01 | QUADRANGLE: | BROOMES ISLAND, MD |
| | 040 | 01 | SIZE OF AREA: | 00044.4 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH. TIDAL |
| | 170 | 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. CRAB. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN PATUXENT RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | 04 |
| 00000807 | 010 | 01 | NAME OF AREA: | ST. PAUL'S POND |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | ROCK HALL, MD |
| | 040 | 01 | SIZE OF AREA: | 00020.2 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | POND |
| | 170 | 01 | BIOTIC COMPONENTS: | WOODLAND. ABUNDANT BASS AND BLUEGILL. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED. ADJACENT TO HISTORIC |

DATE: 10/19/73

13

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|-------------------------|---|
| 00000819 | 02 | DESCRIPTION OF AREA: | LIQUIDAMBAR STYRACIFLUA. |
| | 170 01 | | ADJACENT LAND USED FOR SUMMER HOMES. BEACH, RELATIVELY |
| | 180 02 | | STRAIGHT, UP TO 12 M WIDE. EROSION APPEARS LOW. WATER |
| | 03 | | CLARITY IS POOR. WATER BOTTOM IS SANDY AND OF GENTLE |
| | 04 01 | ECOLOGICAL RATING: | CONTOUR. |
| 00000733 | 410 01 | | 04 |
| | 010 01 | NAME OF AREA: | SUITLAND BOG |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | PRINCE GEORGES |
| | 030 01 | QUADRANGLE: | ANACOSTIA, MD |
| | 040 01 | SIZE OF AREA: | 00008.1 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | BOG |
| | 170 01 | BIOTIC COMPONENTS: | MAGNOLIA VIRGINIANA BOG. DROSER A FILIFORMIS. |
| | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. SILT AND SAND HAVE WASHED |
| | 02 | | INTO THE BOG. MANY OF THE TYPICAL BOG SPECIES HAVE |
| | 03 | | DIED DUE TO THE SILTATION AND OTHER FACTORS OF AREA |
| | 04 | | DEVELOPMENT. |
| | 301 01 | AUTHOR: | SHETLER, STANWYN G. |
| | 303 01 | TITLE: | THE SUITLAND BOG |
| | 304 01 | JOURNAL:VOLUME:PAGES: | ATLANTIC NAT. 25(2):65-68 |
| | 410 01 | ECOLOGICAL RATING: | 03 |
| 00000748 | 010 01 | NAME OF AREA: | DRAYDEN GEOLOGIC SECTION |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | ST. MARY'S |
| | 030 01 | QUADRANGLE: | ST. MARY'S CITY, MD |
| | 040 01 | SIZE OF AREA: | 00024.2 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. BLUFFS WITH FOSSILS ABUNDANT. |
| | 02 | | REPRESENTATIVE OF THE MIOCENE AGE. BLuish SANDY CLAY AND |
| | 03 | | FINE SANDSTONES. RICH IN FOSSIL GASTROPODS. NO |
| | 04 | | IMMINENT PROBLEMS. NO PRESERVATION IN EFFECT. |
| | 410 01 | ECOLOGICAL RATING: | 03 |
| 00000755 | 010 01 | NAME OF AREA: | BUTLERS BLUFF |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | NORTHAMPTON |
| | 030 01 | QUADRANGLE: | TOWNSEND, VA |
| | 040 01 | SIZE OF AREA: | 00052.5 HA |
| | 060 01 | OWNER 1: | PRIVATE |
| | 180 01 | DESCRIPTION OF AREA: | ONLY BLUFF ON EASTERN SHORE |
| | 400 01 | AREA INCL. BUFFER ZONE: | 00080.8 HA |
| | 410 01 | ECOLOGICAL RATING: | 03 |
| 00000765 | 010 01 | NAME OF AREA: | FOUR POINT MARSH |
| | 020 01 | STATE: | VIRGINIA |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|-------------------------|---------------------------------|
| 00000765 | 021 | 01 | COUNTY: | GLOUCESTER |
| | 030 | 01 | QUADRANGLE: | ACHILLES, VA |
| | 040 | 01 | SIZE OF AREA: | 00085.2 |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000800 | 010 | 01 | NAME OF AREA: | GARLAND LAKE |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CAROLINE |
| | 030 | 01 | QUADRANGLE: | DENTON, MD |
| | 040 | 01 | SIZE OF AREA: | 00028.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| 00000801 | 151 | 01 | AQUATIC TYPES: | POND |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. |
| | 410 | 01 | ECOLOGICAL RATING: | PRIME WETLAND. |
| 00000802 | 010 | 01 | NAME OF AREA: | HAMLETON CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | QUEEN ANNE |
| | 030 | 01 | QUADRANGLE: | CHESTERTOWN, MD |
| | 040 | 01 | SIZE OF AREA: | 00076.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| 00000803 | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH, SCIRPUS SPP. |
| | 180 | 01 | DESCRIPTION OF AREA: | IN CHESTER RIVER WATERSHED. |
| | 400 | 01 | AREA INCL. BUFFER ZONE: | |
| | 410 | 01 | ECOLOGICAL RATING: | 00282.8 HA |
| | | | | 03 |
| 00000808 | 010 | 01 | NAME OF AREA: | BAY FOREST DRIVE |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ST. MARY'S |
| | 030 | 01 | QUADRANGLE: | POINT NO POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00056.8 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| 00000809 | 170 | 01 | BIOTIC COMPONENTS: | UPLAND PINE, SUCCESSIONAL |
| | 180 | 01 | DESCRIPTION OF AREA: | NOT AN IMPRESSIVE AREA |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000810 | 010 | 01 | NAME OF AREA: | BODKIN POINT |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | GIBSON ISLAND, MD; |
| | 040 | 01 | SIZE OF AREA: | SPARROWS POINT, MD |
| | 060 | 01 | OWNER I: | 00060.6 HA |
| 00000811 | 151 | 01 | AQUATIC TYPES: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | MARSH, FRESHWATER |
| | 410 | 01 | ECOLOGICAL RATING: | FRESHWATER MARSH WITH TYPHA SP. |
| | | | | 03 |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|----------------------|--|
| 00000811 | 010 | 01 | NAME OF AREA: | EAST NEW MARKET BASIN |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | DORCHESTER |
| | 030 | 01 | QUADRANGLE: | EAST NEW MARKET, MD |
| | 040 | 01 | SIZE OF AREA: | 00137.6 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 180 | 01 | DESCRIPTION OF AREA: | CHOPTANK RIVER WATERSHED. NATURAL RECHARGE BASIN. |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000813 | 010 | 01 | NAME OF AREA: | HART AND MILLER ISLANDS |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | BALTIMORE |
| | 030 | 01 | QUADRANGLE: | SPARROWS POINT, MD; GUNPOWDER NECK, MD |
| | 040 | 01 | SIZE OF AREA: | 00072.7 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH, WITH TYPHA SP. |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000814 | 010 | 01 | NAME OF AREA: | OTTER POINT CREEK |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | HARFORD |
| | 030 | 01 | QUADRANGLE: | EDGEWOOD, MD |
| | 040 | 01 | SIZE OF AREA: | 00315.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 151 | 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 | 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH, SCIRPUS SPP. |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000820 | 010 | 01 | NAME OF AREA: | POPES CREEK GEOLOGIC SECTION |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | POPES CREEK |
| | 040 | 01 | SIZE OF AREA: | 00016.1 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. NEARLY VERTICAL BLUFF ON POTOMAC RIVER ABOUT 25 M HIGH. EXCELLENT EXPOSURE OF EOCENE, MIOCENE AND PLEISTOCENE GEOLOGIC LAYERS, CONTAINING MANY FOSSILS. WITHIN 35 MILES OF WASHINGTON D. C. NO IMMINENT PRESERVATION PROBLEMS. |
| | 410 | 01 | ECOLOGICAL RATING: | 03 |
| 00000827 | 010 | 01 | NAME OF AREA: | MT. VERNON TIDAL MARSH AND FLATS |
| | 020 | 01 | STATE: | VIRGINIA |
| | 021 | 01 | COUNTY: | FAIRFAX |
| | 040 | 01 | SIZE OF AREA: | 00161.6 HA |
| | 060 | 01 | OWNER I: | NATIONAL CAPITAL PARKS |
| | 151 | 01 | AQUATIC TYPES: | MARSH, TIDAL |

CHESAPEAKE BAY SURVEY REPORT
MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG LINE | CAT-DEFINITION | DATA |
|----------|------------|-------------------------|---|
| 00000827 | 410 01 | ECOLOGICAL RATING: | 03 |
| 00000714 | 010 01 | NAME OF AREA: | BENNETT CREEK MARSH |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | NANSEMOND |
| | 030 01 | QUADRANGLE: | NEWPORT NEWS SOUTH, VA; BOWERS HILL, VA |
| | 040 01 | SIZE OF AREA: | 00149.5 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | TIDAL MARSH WITH SPARTINA CYNOSUROIDES. |
| | 180 01 | DESCRIPTION OF AREA: | IN NANSEMOND RIVER WATERSHED. |
| | 400 01 | AREA INCL. BUFFER ZONE: | 00218.1 HA |
| | 410 01 | ECOLOGICAL RATING: | 02 |
| 00000736 | 010 01 | NAME OF AREA: | BROAD CREEK MARSHES |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | PRINCE GEORGES |
| | 030 01 | QUADRANGLE: | MT. VERNON, MD; ALEXANDRIA, MD |
| | 040 01 | SIZE OF AREA: | 00121.1 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, FRESHWATER |
| | 170 01 | BIOTIC COMPONENTS: | FRESHWATER MARSH WITH SCIRPUS SPP. AND TYPHA SP. |
| | 180 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED. SURROUNDED BY RESIDENTIAL DEVELOPMENTS. |
| | 410 01 | ECOLOGICAL RATING: | 02 |
| 00000766 | 010 01 | NAME OF AREA: | HACKS NECK |
| | 020 01 | STATE: | VIRGINIA |
| | 021 01 | COUNTY: | ACCOMACK |
| | 030 01 | QUADRANGLE: | NANDUA CREEK, VA |
| | 040 01 | SIZE OF AREA: | 0226.2 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | MARSH, TIDAL |
| | 170 01 | BIOTIC COMPONENTS: | HIGH TIDAL MARSH. PLANT SPECIES INCLUDE SPARTINA PATENS. DISTICHLIS SP. AND JUNCUS ROEMERIANUS. |
| | 410 01 | ECOLOGICAL RATING: | 02 |
| 00000804 | 010 01 | NAME OF AREA: | LINCHESTER POND |
| | 020 01 | STATE: | MARYLAND |
| | 021 01 | COUNTY: | CAROLINE |
| | 030 01 | QUADRANGLE: | PRESTON, MD |
| | 040 01 | SIZE OF AREA: | 00032.3 HA |
| | 060 01 | OWNER I: | PRIVATE |
| | 151 01 | AQUATIC TYPES: | POND |
| | 180 01 | DESCRIPTION OF AREA: | IN CHOPTANK RIVER WATERSHED. |
| | 410 01 | ECOLOGICAL RATING: | 02 |
| 00000818 | 010 01 | NAME OF AREA: | CHAPEL POINT |

CHESAPEAKE BAY SURVEY REPORT MASTER LIST

DATE: 10/19/73

| SERIAL | CATEG | LINE | CAT-DEFINITION | DATA |
|----------|-------|------|----------------------|---|
| 00000818 | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | MATHIAS POINT, MD |
| | 040 | 01 | SIZE OF AREA: | 00028.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 170 | 01 | BIOTIC COMPONENTS: | UPLAND FOREST HARDWOOD |
| | 180 | 01 | DESCRIPTION OF AREA: | SCENIC VIEW |
| | 410 | 01 | ECOLOGICAL RATING: | 02 |
| 00000821 | 010 | 01 | NAME OF AREA: | PORT TOBACCO |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | CHARLES |
| | 030 | 01 | QUADRANGLE: | PORT TOBACCO, MD |
| | 040 | 01 | SIZE OF AREA: | 00032.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 180 | 01 | DESCRIPTION OF AREA: | IN POTOMAC RIVER WATERSHED, OF HISTORICAL INTEREST. LARGE MARINE AT HEAD OF EMBAYMENT. NO IMMINENT PRESERVATION PROBLEMS. |
| | 410 | 01 | ECOLOGICAL RATING: | 01 |
| 00000822 | 010 | 01 | NAME OF AREA: | WHITEHALL |
| | 020 | 01 | STATE: | MARYLAND |
| | 021 | 01 | COUNTY: | ANNE ARUNDEL |
| | 030 | 01 | QUADRANGLE: | GIBSON ISLAND, MD |
| | 040 | 01 | SIZE OF AREA: | 00032.3 HA |
| | 060 | 01 | OWNER I: | PRIVATE |
| | 180 | 01 | DESCRIPTION OF AREA: | HISTORICAL INTEREST, ESTATE OF HORATIO SHARPE, EARLY GOVERNOR OF MARYLAND |
| | 410 | 01 | ECOLOGICAL RATING: | 01 |

SELGEM MASTER LIST TOTALS

NUMBER OF LINES PRINTED = 002942 NUMBER OF RECORDS PRINTED = 000232

NUMBER OF LINES ON FILE = 002942 NUMBER OF RECORDS ON FILE = 000232

INDEX I - BY STATE AND COUNTY, PAGES 120-129

CHESAPEAKE BAY SUPPLY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|------------------------|-------------------------------|------------|----------|
| MARYLAND, ANNE ARUNDEL | JELP COVE CREEK | 658 | 84 |
| MARYLAND, ANNE ARUNDEL | SACON RIDGE BRANCH | 660 | 65 |
| MARYLAND, ANNE ARUNDEL | FRESH POND | 661 | 60 |
| MARYLAND, ANNE ARUNDEL | FLAT CREEK | 669 | 81 |
| MARYLAND, ANNE ARUNDEL | ROUND BAY BOG | 692 | 91 |
| MARYLAND, ANNE ARUNDEL | GIBSON ISLAND | 737 | 110 |
| MARYLAND, ANNE ARUNDEL | DIAYO POINT | 738 | 106 |
| MARYLAND, ANNE ARUNDEL | POPLAR POINT | 739 | 106 |
| MARYLAND, ANNE ARUNDEL | LYONS CREEK | 769 | 102 |
| MARYLAND, ANNE ARUNDEL | CHESTNUT POINT | 770 | 82 |
| MARYLAND, ANNE ARUNDEL | BEARDS CREEK | 774 | 111 |
| MARYLAND, ANNE ARUNDEL | CREWER POND | 775 | 94 |
| MARYLAND, ANNE ARUNDEL | CEDAR POINT | 796 | 108 |
| MARYLAND, ANNE ARUNDEL | HARNESS CREEK | 797 | 89 |
| MARYLAND, ANNE ARUNDEL | LOCKIN POINT | 810 | 115 |
| MARYLAND, ANNE ARUNDEL | WHITE HALL | 822 | 118 |
| MARYLAND, ANNE ARUNDEL | BUDDY CREEK | 826 | 95 |
| MARYLAND, BALTIMORE | BUNDIE CREEK | 749 | 107 |
| MARYLAND, BALTIMORE | BLACK MARSH | 809 | 113 |
| MARYLAND, BALTI ORE | PART AND MILLER ISLANDS | 813 | 116 |
| MARYLAND, CALVERT | HELLER CREEK HEMLOCK PRESERVE | 311 | 73 |
| MARYLAND, CALVERT | COVE POINT | 668 | 80 |
| MARYLAND, CALVERT | LONG COVE | 790 | 95 |
| | | | 120 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|-----------------------------------|---------------------------------|------------|----------|
| MARYLAND, CALVERT | FISHING CREEK | 675 | 81 |
| MARYLAND, CALVERT | DEEP LANDING | 678 | 81 |
| MARYLAND, CALVERT | PARKER CREEK | 694 | 104 |
| MARYLAND, CALVERT | KITT POINT | 788 | 94 |
| MARYLAND, CALVERT | CALVERT CLIFFS | 798 | 111 |
| MARYLAND, CALVERT | JACK BAY | 803 | 112 |
| MARYLAND, CALVERT; PRINCE GEORGES | ANNE PATUXENT RIVER | 609 | 57 |
| MARYLAND, CAROLINE | SKELETON CREEK | 732 | 87 |
| MARYLAND, CAROLINE | BERRY RUN - BELL CREEK | 741 | 101 |
| MARYLAND, CAROLINE | FRAZIER NECK | 778 | 67 |
| MARYLAND, CAROLINE | CHOPTANK RIVER - LYFORD LANDING | 786 | 68 |
| MARYLAND, CAROLINE | GARLAND LAKE | 800 | 115 |
| MARYLAND, CAROLINE | LINCHESTER POND | 804 | 117 |
| MARYLAND, CAROLINE | HEMLOCK STAND ON MILL CREEK | 812 | 102 |
| MARYLAND, CAROLINE; DORCHESTER | HUNTING CREEK | 693 | 91 |
| MARYLAND, CAROLINE; TALBOT | TUCKAHOE CREEK | 687 | 71 |
| MARYLAND, CECIL | PRINCIPIO CREEK | 659 | 85 |
| MARYLAND, CECIL | RED POINT | 664 | 97 |
| MARYLAND, CECIL | CABIN JOHN CREEK MARSHES | 667 | 85 |
| MARYLAND, CECIL | ELK RIVER | 671 | 98 |
| MARYLAND, CECIL | FRAZER'S LAKE | 697 | 91 |
| MARYLAND, CECIL | SCOTCHMAN CREEK | 731 | 100 |
| MARYLAND, CECIL | POND CREEK | 792 | 95 |
| MARYLAND, CECIL | GARRETT ISLAND | 801 | 112 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|-----------------------------------|---|------------|----------|
| MARYLAND, CECIL | PEARCE CREEK | 824 | 103 |
| MARYLAND, CHARLES | MATTAWOMAN CREEK | 672 | 70 |
| MARYLAND, CHARLES | SWAN POINT NECK - WISE MARSH - NEALE SOUND - WEIR CREEK | 673 | 76 |
| MARYLAND, CHARLES | ZEKIAH SWAMP | 674 | 55 |
| MARYLAND, CHARLES | MANJEMOY CREEK - WARDS RUN | 681 | 59 |
| MARYLAND, CHARLES | BURGESS CREEK | 683 | 82 |
| MARYLAND, CHARLES | PERRY BRANCH | 689 | 65 |
| MARYLAND, CHARLES | PICCOMAXEN CREEK | 699 | 86 |
| MARYLAND, CHARLES | THORN GUT MARSH | 734 | 100 |
| MARYLAND, CHARLES | MARSH ISLAND | 745 | 92 |
| MARYLAND, CHARLES | MARYLAND NECK | 746 | 66 |
| MARYLAND, CHARLES | CEDAR POINT NECK | 777 | 62 |
| MARYLAND, CHARLES | LLOYD CREEK | 779 | 62 |
| MARYLAND, CHARLES | POPES CREEK | 782 | 94 |
| MARYLAND, CHARLES | CHICAMUXEN CREEK | 784 | 72 |
| MARYLAND, CHARLES | DOLLY BOARMANS CREEK | 787 | 88 |
| MARYLAND, CHARLES | CHAPEL POINT | 818 | 117 |
| MARYLAND, CHARLES | POPES CREEK GEOLOGIC SECTION | 820 | 116 |
| MARYLAND, CHARLES | FORT TOBACCO | 821 | 118 |
| MARYLAND, CHARLES; PRINCE GEORGES | MATTAWOMAN CREEK, UPPER | 828 | 79 |
| MARYLAND, DORCHESTER | CHICONE CREEK - BIG CREEK MARSH | 657 | 65 |
| MARYLAND, DORCHESTER | GREEN BRIER SWAMP | 670 | 70 |
| MARYLAND, DORCHESTER | HELL HOOK MARSH - WORLDS END CREEK | 684 | 86 |
| MARYLAND, DORCHESTER | POINT NO POINT - PENKNIFE POINT - REDFIN CREEK | 690 | 90 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|------------------------------|---|------------|----------|
| MARYLAND, DORCHESTER | BLINK-HORN CREEK | 742 | 87 |
| MARYLAND, DORCHESTER | HIGGINS POND | 744 | 106 |
| MARYLAND, DORCHESTER | SAVANNAH LAKE | 771 | 83 |
| MARYLAND, DORCHESTER | LOWER MARSHY HOPE CREEK | 780 | 72 |
| MARYLAND, DORCHESTER | EAST NEW MARKET BASIN | 811 | 116 |
| MARYLAND, HARFORD | OTTER POINT CREEK | 814 | 116 |
| MARYLAND, HARFORD | ROBERT ISLAND - SPENCER ISLAND | 815 | 113 |
| MARYLAND, HARFORD; BALTIMORE | GUNPOWDER FALLS, LOWER | 823 | 108 |
| MARYLAND, KENT | CEDARS, THE - CHURCH CREEK - RINGGOLD POINT | 665 | 57 |
| MARYLAND, KENT | HOWELL POINT | 679 | 76 |
| MARYLAND, KENT | CYPRESS BRANCH | 696 | 98 |
| MARYLAND, KENT | SWAN POINT - TAVERN CREEK | 773 | 78 |
| MARYLAND, KENT | NICHOLS POINT | 781 | 79 |
| MARYLAND, KENT | MORGAN CREEK | 791 | 83 |
| MARYLAND, KENT | SANDY BOTTOM TALBOT TERRACE SCARP | 816 | 113 |
| MARYLAND, PRINCE GEORGES | SUITLAND BOG | 733 | 114 |
| MARYLAND, PRINCE GEORGES | BROAD CREEK MARSHES | 736 | 117 |
| MARYLAND, PRINCE GEORGES | PISCATAWAY CREEK | 793 | 95 |
| MARYLAND, QUEEN ANNE | HOOD POINT - PINEY POINT - MARSHY CREEK | 662 | 85 |
| MARYLAND, QUEEN ANNE | KENT POINT | 663 | 85 |
| MARYLAND, QUEEN ANNE | WAREHOUSE CREEK | 677 | 76 |
| MARYLAND, QUEEN ANNE | WYE RIVER | 735 | 72 |
| MARYLAND, QUEEN ANNE | ANDOVER BRANCH | 740 | 101 |
| MARYLAND, QUEEN ANNE | REED CREEK - GORDON POINT - WRIGHT NECK | 794 | 61 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|------------------------------|--|------------|----------|
| MARYLAND, QUEEN ANNE | HAMBLETON CREEK | 802 | 115 |
| MARYLAND, QUEEN ANNE, TALBOT | WYE EAST RIVER | 795 | 68 |
| MARYLAND, QUEEN ANNES | SOUTHEAST CREEK - BROWNS BRANCH | 747 | 107 |
| MARYLAND, SOMERSET | LANGFORD MARSH - RICHARDSON MARSH - MARUMSLO CREEK | 680 | 86 |
| MARYLAND, SOMERSET | SOUTH MARSH ISLAND | 682 | 81 |
| MARYLAND, ST. MARY'S | CHAPTICO RUN | 656 | 80 |
| MARYLAND, ST. MARY'S | KILLPECK CREEK - TRENT HALL CREEK | 666 | 65 |
| MARYLAND, ST. MARY'S | MEDLEY CREEK | 698 | 98 |
| MARYLAND, ST. MARY'S | CHERRYFIELD POINT | 743 | 92 |
| MARYLAND, ST. MARY'S | DRAYDEN GEOLOGIC SECTION | 748 | 114 |
| MARYLAND, ST. MARY'S | SPRING CREEK | 772 | 67 |
| MARYLAND, ST. MARY'S | ST. MARY'S RIVER | 776 | 79 |
| MARYLAND, ST. MARY'S | CORNFIELD POINT GEOLOGIC SECTION | 799 | 112 |
| MARYLAND, ST. MARY'S | NEWTOWN NECK | 805 | 102 |
| MARYLAND, ST. MARY'S | POPLAR HILL CREEK | 806 | 68 |
| MARYLAND, ST. MARY'S | ST. PAUL'S POND | 807 | 112 |
| MARYLAND, ST. MARY'S | BAY FOREST DRIVE | 808 | 115 |
| MARYLAND, ST. MARY'S | POINT LOOK-IN | 819 | 113 |
| MARYLAND, TALBOT | HARBOR COVE-LOWES POINT | 676 | 98 |
| MARYLAND, TALBOT | KINGS CREEK - KINGSTON LANDING | 685 | 76 |
| MARYLAND, TALBOT | MILES CREEK | 686 | 57 |
| MARYLAND, TALBOT | BARKERS CREEK | 695 | 77 |
| MARYLAND, TALBOT | BOW KNEE POINT | 783 | 67 |
| MARYLAND, TALBOT | CHOPTANK RIVER (BRUCEVILLE) | 785 | 72 |
| MARYLAND, TALBOT | LLOYD LANDING | 789 | 68 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|---|--|------------|----------|
| MARYLAND, WICOMICO | NUTTERS NECK | 688 | 86 |
| MARYLAND, WICOMICO | REWASTICO CREEK - ROUND ISLAND - FERRY POINT | 691 | 77 |
| MARYLAND, WICOMICO | STUMP POINT | 817 | 108 |
| MARYLAND, WORCESTER; WICOMICO; SOMERSE | POCOMOKE RIVER SWAMP | 610 | 55 |
| VIRGINIA, ACCOMACK | BIG MARSH - TOBASCO ISLAND - SAVAGE ISLAND | 641 | 84 |
| VIRGINIA, ACCOMACK | BYRDS MARSH - PARKSLEY MARSHES | 642 | 103 |
| VIRGINIA, ACCOMACK | HYSLOP MARSH | 647 | 97 |
| VIRGINIA, ACCOMACK | PITTS CREEK MARSH | 761 | 111 |
| VIRGINIA, ACCOMACK | WEST POINT - FINNEYS ISLAND - PARKERS ISLAND - | 764 | 111 |
| VIRGINIA, ACCOMACK | HACKS NECK | 766 | 117 |
| VIRGINIA, ACCOMACK | TANGIER ISLAND | 767 | 93 |
| VIRGINIA, CAROLINE | WHITE MARSH - SKINKERS NECK | 751 | 93 |
| VIRGINIA, CHARLES CITY | MORRIS CREEK MARSH | 616 | 73 |
| VIRGINIA, CHARLES CITY | PARSONS ISLAND - OLD NECK | 639 | 69 |
| VIRGINIA, CHARLES CITY | WEYANCKE POINT | 713 | 66 |
| VIRGINIA, CHARLES CITY | HERRING CREEK MARSH | 724 | 82 |
| VIRGINIA, CHARLES CITY; JAMES CITY; NE CHICKAHOMINY, LOWER - PROVIDENCE FORGE | | 601 | 56 |
| VIRGINIA, CHESAPEAKE; VIRGINIA BEACH | NORTH LANDING RIVER SWAMP - POCATY CREEK SWAMP | 638 | 90 |
| VIRGINIA, ESSEX | PISCATAWAY CREEK MARSH | 633 | 84 |
| VIRGINIA, ESSEX | MARSH POINT - GREEN BAY - HORSE HEAD POINT | 637 | 74 |
| VIRGINIA, ESSEX | MOUNT LANDING CREEK MARSH | 648 | 109 |
| VIRGINIA, ESSEX | HOSKINS CREEK MARSH | 725 | 92 |
| VIRGINIA, ESSEX | PAYNES ISLAND MARSHES | 762 | 101 |
| VIRGINIA, FAIRFAX | POHICK - ACCOTINK CREEKS, Upper, LOWER | 624 | 89 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|--|-------------------------------------|------------|----------|
| VIRGINIA, FAIRFAX | DOGUE CREEK, UPPER | 701 | 82 |
| VIRGINIA, FAIRFAX | MT. VERNON TIDAL MARSH AND FLATS | 827 | 116 |
| VIRGINIA, GLOUCESTER | GUINEA MARSHES | 654 | 90 |
| VIRGINIA, GLOUCESTER | CATLETT ISLANDS | 706 | 87 |
| VIRGINIA, GLOUCESTER | BUSH POINT MARSH | 754 | 110 |
| VIRGINIA, GLOUCESTER | FOUR POINT MARSH | 765 | 114 |
| VIRGINIA, GLOUCESTER; KING AND QUEEN | POROPOTANK MARSH - PURTAIN MARSH | 620 | 58 |
| VIRGINIA, HAMPTON | LONG CREEK MARSH | 702 | 109 |
| VIRGINIA, HENRICO | CHARLES NECK SWAMP | 718 | 99 |
| VIRGINIA, HENRICO; HANOVER; NEW KENT | CHICKAHOMINY, UPPER | 602 | 61 |
| VIRGINIA, ISLE OF WIGHT | PAGAN RIVER MARSH | 649 | 103 |
| VIRGINIA, ISLE OF WIGHT | RAGGED ISLAND - BALLARD MARSH | 730 | 106 |
| VIRGINIA, ISLE OF WIGHT; SOUTHAMPTON; | BLACKWATER RIVER | 605 | 58 |
| VIRGINIA, ISLE OF WIGHT; SURRY | LAWNES CREEK MARSH | 655 | 103 |
| VIRGINIA, JAMES CITY | COLLEGE CREEK MARSH | 611 | 96 |
| VIRGINIA, JAMES CITY | YARMOUTH ISLANDS - SIMPSON - WRIGHT | 621 | 63 |
| VIRGINIA, JAMES CITY | CHISEL RUN BOG | 626 | 74 |
| VIRGINIA, JAMES CITY | POWHATAN CREEK | 627 | 59 |
| VIRGINIA, JAMES CITY | GORDON ISLAND | 632 | 64 |
| VIRGINIA, JAMES CITY | BIG MARSH POINT | 752 | 93 |
| VIRGINIA, JAMES CITY | PASSMORE CREEK | 831 | 63 |
| VIRGINIA, KING AND QUEEN | GARNETTS CREEK MARSH | 720 | 66 |
| VIRGINIA, KING AND QUEEN | GLEASON MARSH | 721 | 105 |
| VIRGINIA, KING AND QUEEN; KING WILLIAM | MATTAPONI RIVER, LOWER | 607 | 56 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|---------------------------|--|------------|----------|
| VIRGINIA, KING AND QUEEN; | MIDDLESEX; G DRAGON RUN ESSEX | 608 | 55 |
| VIRGINIA, KING GEORGE | CHOTANK CREEK | 615 | 59 |
| VIRGINIA, KING GEORGE | SMOOT TRACT | 622 | 64 |
| VIRGINIA, KING GEORGE | PERSIMMON POINT | 711 | 78 |
| VIRGINIA, KING GEORGE | CLEVE MARSH | 717 | 78 |
| VIRGINIA, KING GEORGE | GAMBO CREEK MARSH | 830 | 83 |
| VIRGINIA, KING GEORGE; | CAROLINE CORBINS NECK - MOSS NECK | 756 | 107 |
| VIRGINIA, KING GEORGE | UPPER NACHODOC CREEK | 712 | 104 |
| VIRGINIA, KING WILLIAM | ELTHAM MARSH | 644 | 75 |
| VIRGINIA, KING WILLIAM | SWEET HALL MARSH | 646 | 103 |
| VIRGINIA, KING WILLIAM | COHOKE MARSH | 651 | 97 |
| VIRGINIA, KING WILLIAM | LEE MARSH | 653 | 75 |
| VIRGINIA, KING WILLIAM | BROOKS CREEK MARSH | 705 | 99 |
| VIRGINIA, KING WILLIAM; | KING AND QUEEN MATTAPONI RIVER, UPPER | 606 | 84 |
| VIRGINIA, LANCASTER | MOSQUITO ISLAND | 727 | 105 |
| VIRGINIA, LANCASTER | NORTH POINT MARSH | 760 | 108 |
| VIRGINIA, MATHEWS | WINTER HARBOR MARSH - GARDEN CREEK MARSH | 650 | 97 |
| VIRGINIA, MATHEWS | LILLEYS NECK | 726 | 87 |
| VIRGINIA, MATHEWS | RIGBY ISLAND | 763 | 102 |
| VIRGINIA, NANSEMOND | BENNETT CREEK MARSH | 714 | 117 |
| VIRGINIA, NANSEMOND | NANSEMOND RIVER | 715 | 110 |
| VIRGINIA, NANSEMOND; | PORTSMOUTH HOFFLER CREEK MARSH | 708 | 109 |
| VIRGINIA, NEW KENT | WEST ISLAND | 640 | 70 |
| VIRGINIA, NEW KENT | COUSIAC MARSH | 643 | 74 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|---|---------------------------|------------|----------|
| VIRGINIA, NEW KENT | LILLY POINT MARSH | 645 | 58 |
| VIRGINIA, NEW KENT | HILL MARSH | 652 | 75 |
| VIRGINIA, NEW KENT; CHARLES CITY; HENR CHICKAHOMINY, MIDDLE | | 603 | 56 |
| VIRGINIA, NEW KENT; JAMES CITY | TERRAPIN POINT | 634 | 64 |
| VIRGINIA, NEWPORT NEWS | WARWICK RIVER | 704 | 99 |
| VIRGINIA, NEWPORT NEWS CITY | MULBERRY ISLAND | 604 | 103 |
| VIRGINIA, NORTHAMPTON | BUTLERS BLUFF | 755 | 114 |
| VIRGINIA, NORTHUMBERLAND | BLUFF POINT MARSH | 614 | 63 |
| VIRGINIA, NORTHUMBERLAND | BELL SWAMP - OWEN POND | 703 | 77 |
| VIRGINIA, NORTHUMBERLAND | HACK CREEK | 722 | 92 |
| VIRGINIA, NORTHUMBERLAND | HALL TRACT | 723 | 100 |
| VIRGINIA, NORTHUMBERLAND | DAMERON MARSH | 757 | 101 |
| VIRGINIA, PRINCE GEORGE | POWELL CREEK | 729 | 105 |
| VIRGINIA, PRINCE GEORGE | WARDS CREEK | 750 | 110 |
| VIRGINIA, PRINCE GEORGE | KENNON MARSH | 758 | 93 |
| VIRGINIA, PRINCE GEORGE; SURRY | UPPER CHIPPOKES CREEK | 635 | 61 |
| VIRGINIA, PRINCE WILLIAM | NEABSCO CREEK MARSH | 623 | 96 |
| VIRGINIA, PRINCE WILLIAM | POWELLS CREEK | 625 | 109 |
| VIRGINIA, PRINCE WILLIAM | QUANTICO CREEK | 628 | 96 |
| VIRGINIA, PRINCE WILLIAM; STAFFORD | CHOPAWANSIC CREEK | 829 | 79 |
| VIRGINIA, RICHMOND | CAT POINT CREEK MARSH | 630 | 89 |
| VIRGINIA, RICHMOND | LITTLE CARTER CREEK MARSH | 707 | 77 |
| VIRGINIA, RICHMOND; ESSEX | BROAD CREEK MARSH | 710 | 71 |
| VIRGINIA, STAFFORD | POTOMAC CREEK | 612 | 73 |

CHESAPEAKE BAY SURVEY REPORT

| STATE/COUNTY | NAME OF AREA | SERIAL NO. | PAGE NO. |
|-------------------------------|------------------------------------|------------|----------|
| VIRGINIA, STAFFORD | ACCAKEEK CREEK | 618 | 69 |
| VIRGINIA, STAFFORD | AQUIA CREEK | 709 | 99 |
| VIRGINIA, STAFFORD | BRANT MARSH | 753 | 88 |
| VIRGINIA, SURRY | SUNKEN MEADOW | 613 | 69 |
| VIRGINIA, SURRY | GRAYS CREEK MARSH | 619 | 80 |
| VIRGINIA, SURRY | CROUCHES CREEK - TIMBER NECK CREEK | 631 | 90 |
| VIRGINIA, SURRY | WARREN TRACT | 768 | 88 |
| VIRGINIA, SURRY | CHIPPOKES CREEK MARSH, LOWER | 832 | 96 |
| VIRGINIA, WESTMORELAND | BRIDGES CREEK MARSH | 629 | 74 |
| VIRGINIA, WESTMORELAND | HOLLIS MARSH | 636 | 60 |
| VIRGINIA, WESTMORELAND | CURRIOWAN BAY | 700 | 62 |
| VIRGINIA, WESTMORELAND | NOMINI CLIFFS | 759 | 107 |
| VIRGINIA, WESTMORELAND; ESSEX | DRAKES MARSH - OTTERBURN MARSH | 719 | 71 |
| VIRGINIA, YORK | GOODWIN ISLANDS | 617 | 89 |
| VIRGINIA, YORK | BLACKWALNUT RIDGE - COW ISLAND | 716 | 105 |

PAGE: 130

INDEX II - BY ALPHABETICAL ORDER, PAGES 131-140

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|--|------------|----------|
| ACCAKEEK CREEK | 618 | 69 |
| ANDOVER BRANCH | 740 | 101 |
| AQUIA CREEK | 709 | 99 |
| BACON RIDGE BRANCH | 660 | 65 |
| BARKERS CREEK | 695 | 77 |
| BAY FOREST DRIVE | 808 | 115 |
| BEARDS CREEK | 774 | 111 |
| BELL SWAMP - OWEN POND | 703 | 77 |
| BENNETT CREEK MARSH | 714 | 117 |
| BERRY RUN - BELL CREEK | 741 | 101 |
| BIG MARSH - TOBASCO ISLAND - SAVAGE ISLAND | 641 | 84 |
| BIG MARSH POINT | 752 | 93 |
| BLACK MARSH | 809 | 113 |
| BLACKWALNUT RIDGE - COW ISLAND | 716 | 105 |
| BLACKWATER RIVER | 605 | 58 |
| BLINKHORN CREEK | 742 | 87 |
| BLUFF POINT MARSH | 614 | 63 |
| BODKIN POINT | 810 | 115 |
| BOW KNEE POINT | 783 | 67 |
| BRANT MARSH | 753 | 88 |
| BREWER POND | 775 | 94 |
| BRIDGES CREEK MARSH | 629 | 74 |
| BROAD CREEK MARSH | 710 | 71 |
| BROAD CREEK MARSHES | 736 | 117 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | S. RIAL NO. | PAGE NO. |
|---|-------------|----------|
| BROOKS CREEK MARSH | 705 | 99 |
| BURGESS CREEK | 683 | 82 |
| BUSH POINT MARSH | 754 | 110 |
| BUTLERS BLUFF | 755 | 114 |
| BYRDS MARSH - PARKSLEY MARSHES | 642 | 103 |
| CABIN JOHN CREEK MARSHES | 667 | 85 |
| CALVERT CLIFFS | 798 | 111 |
| CAT POINT CREEK MARSH | 630 | 89 |
| CATLETT ISLANDS | 706 | 87 |
| CEDAR POINT | 796 | 108 |
| CEDAR POINT NECK | 777 | 62 |
| CEDARS, THE - CHURCH CREEK - RINGGOLD POINT | 665 | 57 |
| CHAPEL POINT | 818 | 117 |
| CHAPTICO RUN | 656 | 80 |
| CHARLES NECK SWAMP | 718 | 99 |
| CHERRYFIELD POINT | 743 | 92 |
| CHESTNUT POINT | 770 | 82 |
| CHICAMUXEN CREEK | 784 | 72 |
| CHICKAHOMINY, LOWER - PROVIDENCE FORGE | 601 | 56 |
| CHICKAHOMINY, MIDDLE | 603 | 56 |
| CHICKAHOMINY, UPPER | 602 | 61 |
| CHICONE CREEK - BIG CREEK MARSH | 657 | 65 |
| CHIPPOKES CREEK MARSH, LOWER | 832 | 96 |
| CHISEL RUN BOG | 626 | 74 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|-------------------------------------|------------|----------|
| CHOPAWATSIK CREEK | 829 | 79 |
| CHOPTANK RIVER - LYFORD LANDING | 786 | 68 |
| CHOPTANK RIVER (BRUCEVILLE) | 785 | 72 |
| CHOTANK CREEK | 615 | 59 |
| CLEVE MARSH | 717 | 78 |
| COHOKE MARSH | 651 | 97 |
| COLLIGE CREEK MARSH | 611 | 96 |
| CORBINS NECK - MOSS NECK | 756 | 107 |
| CORNFIELD POINT GEOLOGIC SECTION | 799 | 112 |
| COUSIAC MARSH | 643 | 74 |
| COVE POINT | 668 | 80 |
| CROUCHE'S CREEK - TIMBER NECK CREEK | 631 | 90 |
| CURRIAN BAY | 700 | 62 |
| CYPRESS BRANCH | 696 | 98 |
| DAMENON MARSH | 757 | 101 |
| DEEP COVE CREEK | 658 | 84 |
| DEEP LANDING | 678 | 81 |
| DOGUE CREEK, UPPER | 701 | 82 |
| DOLLY BEARMANS CREEK | 787 | 88 |
| DRAGON RUN | 608 | 55 |
| DRAKES MARSH - OTTERBURN MARSH | 719 | 71 |
| DRAYDEN GEOLOGIC SECTION | 746 | 114 |
| DUNDIE CREEK | 749 | 113 |
| EAST NEW MARKET BASIN | 811 | 116 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|------------------------|------------|----------|
| ELK RIVER | 671 | 98 |
| ELTHAM MARSH | 644 | 75 |
| FISHING CREEK | 675 | 81 |
| FLAT CREEK | 669 | 81 |
| FOUR POINT MARSH | 765 | 114 |
| FRAZER'S LAKE | 697 | 91 |
| FRAZIER NECK | 778 | 67 |
| FRESH FOND | 661 | 60 |
| GAMBO CREEK MARSH | 830 | 83 |
| GARLAND LAKE | 800 | 115 |
| GARNETTS CREEK MARSH | 720 | 66 |
| GARRETT ISLAND | 801 | 112 |
| GIBSON ISLAND | 737 | 110 |
| GLEASON MARSH | 721 | 105 |
| GOODWIN ISLANDS | 617 | 89 |
| GORDON ISLAND | 632 | 64 |
| GRAYS CREEK MARSH | 619 | 80 |
| GREEN ERIE SWAMP | 670 | 70 |
| GUINFA MARSHES | 654 | 90 |
| GUNPOWDER FALLS, LOWER | 823 | 108 |
| HACK CREEK | 722 | 92 |
| HACKS NECK | 766 | 117 |
| HALL TRACT | 723 | 100 |
| HAMBLET CREEK | 802 | 115 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|--|------------|----------|
| HARBOR COVE-LOWES POINT | 676 | 98 |
| HARNFSS CREEK | 797 | 89 |
| HART AND MILLER ISLANDS | 813 | 116 |
| HELL HOOK MARSH - WORLDS END CREEK | 684 | 86 |
| HELLFN CREEK HEMLOCK PRESERVE | 311 | 73 |
| HEMLOCK STAND ON MILL CREEK | 812 | 102 |
| HERRING CREEK MARSH | 724 | 82 |
| HIGGINS POND | 744 | 106 |
| HILL MARSH | 652 | 75 |
| HOFFLEF CREEK MARSH | 708 | 109 |
| HOLLIS MARSH | 636 | 60 |
| HOOD POINT - PINEY POINT - MARSHY CREEK | 662 | 85 |
| HOSKINS CREEK MARSH | 725 | 92 |
| HOWELL POINT | 679 | 76 |
| HUNTING CREEK | 693 | 91 |
| HYSLOP MARSH | 647 | 97 |
| JACK EAY | 803 | 112 |
| KENNON MARSH | 758 | 93 |
| KENT POINT | 663 | 85 |
| KILLPECK CREEK - TRENT HALL CREEK | 666 | 65 |
| KINGS CREEK - KINGSTON LANDING | 685 | 76 |
| KITT POINT | 788 | 94 |
| LANGFORD MARSH - RICHARDSON MARSH - MARJMSLO CREEK | 680 | 86 |
| LAWHES CREEK MARSH | 655 | 103 |

CHESAPEAKE BAY SURVEY REPORT

NAME OF AREA

SERIAL NO.

PAGE NO.

LEE MARSH

653

75

LILLYS NECK

726

87

LILLY POINT MARSH

645

58

LINCHESTER POND

804

117

LITTLE CARTER CREEK MARSH

707

77

LLOYD CREEK

779

62

LLOYD LANDING

789

68

LONG COVE

790

95

LONG CREEK MARSH

702

109

LOWER MARSHYHOPE CREEK

780

72

LYONS CREEK

769

102

MARSH ISLAND

745

92

MARSH POINT - GREEN BAY - HORSE HEAD POINT

637

74

MARYLAND NECK

746

66

MATTAPONI RIVER, LOWER

607

56

MATTAPONI RIVER, UPPER

606

84

MATTAWMAN CREEK

672

70

MATTAWMAN CREEK, UPPER

828

79

MAYO POINT

738

106

MEDLFY CREEK

698

98

MILES CREEK

686

57

MORGAN CREEK

791

83

MORRIS CREEK MARSH

616

73

MOSQUITO ISLAND

727

105

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|--|------------|----------|
| MOUNT LANDING CREEK MARSH | 648 | 109 |
| MT. VERNON TIDAL MARSH AND FLATS | 827 | 116 |
| MUDDY CREEK | 826 | 95 |
| MULBERRY ISLAND | 604 | 103 |
| NANJEMOY CREEK - WARDS RUN | 681 | 59 |
| NANSEMOND RIVER | 715 | 110 |
| NEABSCO CREEK MARSH | 623 | 96 |
| NEWTOWN NECK | 805 | 102 |
| NICHOLS POINT | 781 | 79 |
| NOMINI CLIFFS | 759 | 107 |
| NORTH LANDING RIVER SWAMP - POCATY CREEK SWAMP | 638 | 90 |
| NORTH POINT MARSH | 760 | 108 |
| NUTTERS NECK | 688 | 86 |
| OTTER POINT CREEK | 814 | 116 |
| PAGAN RIVER MARSH | 649 | 103 |
| PARKER CREEK | 694 | 104 |
| PARSONS ISLAND - OLD NECK | 639 | 69 |
| PASSMORE CREEK | 831 | 63 |
| PATUXENT RIVER | 609 | 57 |
| PAYNES ISLAND MARSHES | 762 | 101 |
| PEARCE CREEK | 824 | 103 |
| PERRY BRANCH | 689 | 65 |
| PERSIMMON POINT | 711 | 78 |
| PICCOMAXFEN CREEK | 699 | 86 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|--|------------|----------|
| PISCATAWAY CREEK | 793 | 95 |
| PISCATAWAY CREEK MARSH | 633 | 84 |
| PITTS CREEK MARSH | 761 | 111 |
| PCCOMCKE RIVER SWAMP | 610 | 55 |
| POHICK - ACCOTINK CREEKS, UPPER, LOWER | 624 | 89 |
| POINT LOOK-IN | 819 | 113 |
| POINT NO POINT - PENKNIFE POINT - REDFIN CREEK | 690 | 90 |
| POND CREEK | 792 | 95 |
| PODES CREEK | 782 | 94 |
| PODES CREEK GEOLOGIC SECTION | 820 | 116 |
| POFLAR HILL CREEK | 806 | 68 |
| POPLAR POINT | 739 | 106 |
| POPODOTANK MARSH - PURTAN MARSH | 620 | 58 |
| PORT TOBACCO | 821 | 118 |
| POTOMAC CREEK | 612 | 73 |
| FOWELL CREEK | 729 | 105 |
| POWELLS CREEK | 625 | 109 |
| POWHATAN CREEK | 627 | 59 |
| PRINCIPIO CREEK | 659 | 85 |
| QUANTICO CREEK | 628 | 96 |
| RAGGED ISLAND - BALLARD MARSH | 730 | 106 |
| RED POINT | 664 | 97 |
| REED CREEK - GURDON POINT - WRIGHT NECK | 794 | 61 |
| REWASTICO CREEK - ROUND ISLAND - FERRY POINT | 691 | 77 |

CHESAPEAKE BAY SURVEY REPORT

| NAME OF AREA | SERIAL NO. | PAGE NO. |
|---|------------|----------|
| RIGBY ISLAND | 763 | 102 |
| ROBERT ISLAND - SPENCER ISLAND | 815 | 113 |
| ROUND BAY BOG | 692 | 91 |
| SANDY BOTTOM TALBOT TERRACE SCARP | 816 | 113 |
| SAVANNAH LAKE | 771 | 83 |
| SCOTCHMAN CREEK | 731 | 100 |
| SKELFTON CREEK | 732 | 87 |
| SMOOT TRACT | 622 | 64 |
| SOUTH MARSH ISLAND | 682 | 81 |
| SOUTHEAST CREEK - BROWNS BRANCH | 747 | 107 |
| SPRING CREEK | 772 | 67 |
| ST. MARY'S RIVER | 776 | 79 |
| ST. PAUL'S POND | 807 | 112 |
| STUMP POINT | 817 | 108 |
| SUITLAND BOG | 733 | 114 |
| SUNKEN MEADOW | 613 | 69 |
| SWAN POINT - TAVERN CREEK | 773 | 78 |
| SWAN POINT NECK - WISE MARSH - NEALE SOUND - WEIR | 673 | 76 |
| SWEET HALL MARSH | 646 | 103 |
| TANGIER ISLAND | 767 | 93 |
| TERRAPIN POINT | 634 | 64 |
| THORN GUT MARSH | 734 | 100 |
| TUCKAHEE CREEK | 687 | 71 |
| UPPER CHIPPOKES CREEK | 635 | 61 |

CHESAPEAKE BAY SURVEY REPORT

NAME OF AREA

S. RIAL NO.

PAGE NO.

UPPER MACHODOC CREEK

712

104

WARDS CREEK

750

110

WAREHOUSE CREEK

677

76

WARREN TRACT

768

88

WARWICK RIVER

704

99

WEST ISLAND

640

70

WEST POINT - FINNEYS ISLAND - PARKERS ISLAND -

764

111

WEYANOKO POINT

713

66

WHITE MARSH - SKINKERS NECK

751

93

WHITEHALL

822

118

WINTER HARBOR MARSH - GARDEN CREEK MARSH

650

97

WYE FAST RIVER

795

68

WYE RIVER

735

72

YARMOUTH ISLANDS - SIMPSON - WRIGHT

621

63

ZEKIAH SWAMP

674

55

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APPENDIX A

DESCRIPTION OF THE CHESAPEAKE BAY REGION

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DESCRIPTION OF CHESAPEAKE BAY REGION

The Chesapeake Bay area as shown on the accompanying maps including the tidewater counties of Maryland, Virginia, and Delaware covers an area of about 100 by 200 miles or about 20,000 square miles. This area is divided as follows (Jenkins, 1971):

| | <u>Square Miles</u> |
|-----------------------------------|---------------------|
| Maryland | 6800 |
| Virginia | 6700 |
| Delaware | 2100 |
| Chesapeake Bay and tributaries | <u>4400</u> |
| Total | 20000 |

The name Chesapeake is derived from its original Indian name, and literal interpretations vary from "Great Waters" to "Mother of Waters", all refer to its immense size (Shands and Mathes, 1972), and, in fact, Chesapeake Bay is the largest estuary on the East Coast, and with its tributaries it is considered by some scientists to be the greatest estuarine system in the world. Four major rivers and 50 large tributaries drain into Chesapeake Bay from headwaters in New York, Pennsylvania, West Virginia, Delaware, Maryland, and Virginia. The shoreline (particularly the western edge) is irregularly digitated by the tidal river estuaries. The tidal shore line is about 4,600 miles in length, of which 3,400 are miles in Maryland and 1,200 miles in Virginia (Corps, 1970).

The Bay has a drainage basin of 74,000 square miles an area larger than all of New England. The Susquehanna River (largest river in the eastern U. S.) contributes 49 percent of the annual freshwater runoff of the entire Bay, and 87 percent of that north of the mouth of the Potomac. The Potomac River estuary contributes about 18 percent of the total freshwater inflow into the Bay. The annual contribution by the other western rivers are: James - 16 percent; Rappahannock - 4 percent; York - 2 percent; and others - 4 percent. The eastern rivers (Choptank, Nanticoke and Wicomico) contribute only 7 percent of the total runoff (Saila, 1973).

The mean tidal fluctuation in Chesapeake Bay is small, generally between one and two feet. Saline water intrusion is highest along the eastern side of the estuary due to the influence of the Coriolis force. Salinities range from 35 parts per thousand inside the mouth of the bay to near zero at the north end of the bay and at the heads of embayments tributary to the bay. Spring floods and the relatively dry fall

periods contribute to seasonal variations in salinity throughout the Bay.

The Chesapeake Bay study area lies entirely within the Atlantic Coastal Plain, and is underlain by a thick, wedge-shaped series of sedimentary formations which strike northeast and dip gently toward the southeast. These "soft" rocks are composed of mostly unconsolidated beds of sands, clays, marls, and gravels, which range from Lower Cretaceous to Recent in age. The base upon which these sedimentary formations rest is composed of very ancient, predominantly pre-Cambrian, crystalline rocks upon which a prolonged pre-Cretaceous erosion cycle produced a peneplained surface. Along the inner westernmost edge of the Coastal Plain, the crystalline rocks emerge from beneath the overlapping unconsolidated formations along a line of demarcation known as the "Fall Line" which marks the head of navigation on some tributaries to Chesapeake Bay, such as the Patapsco River at Baltimore, the Potomac River at Washington, and the Rappahannock River at Fredericksburg, Virginia. The Fall Line also marks a topographic change westward, from the flat or gently rolling low elevation of the Coastal Plain to the higher elevated, bolder relief of the Piedmont Plateau (Corps, 1970).

Of the 20,000 square miles of the Chesapeake Bay region, 15,600 square miles are land. Table 1 shows the distribution of this land into forests, agricultural land, pasture, urban areas, and marsh wetlands.

The forest land covers an area of slightly over 6 million acres or 9450 square miles. Forests include 68 percent of the tidewater counties of Maryland, 60 percent of Virginia and 48 percent of Delaware. The total value of the cut timber (stumpage) is about \$13 million in Maryland, \$13 million in Virginia, and \$0.5 million in Delaware.

The forests of the Chesapeake Bay include the combination of oak, hickory, and pine as the major type, but, in the southern part, the combinations are oak with hickory, oak with pine, loblolly pine with shortleaf pine, and oak with gum and cypress. In many areas with better soils there are a large number of mixed mesophytic deciduous species with maple, tulip tree, beech, gum, various species of oak, flood plain species of ash, elm, maple, sycamore, birch, and many other species. The main timber trees are red and white oak, tulip tree, pine, sweetgum, and various other hardwoods.

TABLE 1. - LAND USE IN CHESAPEAKE STUDY AREA

| Use | Maryland (percent) | Virginia (percent) | Delaware (percent) |
|--------------------|-----------------------|-----------------------|-----------------------|
| Forest | 68 | 60 | 48 |
| Agricultural Crops | 23 | 23 | 32 |
| Pasture | 6 | 2 | 2.5 |
| Urban/industrial | 3 | 6 | 9 |
| Coastal marsh | - | - | 8.5 |

The agricultural cropland of the tidewater counties covers an area of 3670 square miles. The agricultural cropland of the Bay region in Maryland is 23 percent, in Virginia 23 percent, and in Delaware 32 percent. The value of agricultural crops and livestock of this region is an estimated \$500 million dollars.

Figure 1 shows the agricultural crops of the Chesapeake Bay region. These include mainly corn, soybeans, barley, potatoes, tobacco, peanuts, hay, and tomatoes and other vegetables. The eastern shore of Maryland is agriculturally suited for truck crops because of its sandy productive soil, sufficient water, and long growing period. The most important crops are soybeans, corn, wheat, and vegetable crops. On the western shore of Maryland the major crops are hay, corn, tobacco, wheat, and some soybeans, and vegetables. In the Virginia region, the main agricultural crops are corn, soybeans, peanuts, wheat, barley, and tobacco. In the Delaware area the main crops are corn, soybeans, hay, barley, rye, oats, and lima beans, and other vegetables.

Extensive vegetation along the Chesapeake Bay shoreline includes salt marshes and wetlands. This vegetation is estimated to be 8.5 percent of the land area in Delaware alone. Recent studies show the wetlands comprise 152,000 acres in Virginia (Wass and Wright, 1969), and 84,000 acres in Maryland (McHarg, 1972). Other sources indicate that there are perhaps as much as 500,000 acres of wetlands in the Bay area (USDI, 1970). These wetlands are of great importance to wildlife and production of aquatic life. The main vegetation is grass of various types, saltbush, cattail, and many other species of plants. Salt grass is mowed in some of the regions and is valuable for mulch and other uses (Jenkins, 1971).

The climate of the Bay region is moderate with average annual temperature varying a few degrees from the northern to the southern end of the Bay. The average annual temperature is 55°F in the north,

with an average of 190 frost-free days annually to 60°F in the south with an average of 210 frost-free days.

Normal annual total precipitation is 44 inches throughout the Bay region. Prolonged droughts are rare but short dry spells prompt the use of supplemental irrigation for the production of crops (Forest Service and Soil Conservation Service, 1972).

USES AND PRESSURES

Chesapeake Bay has provided man with food, wealth, an easy means of travel, and satisfaction for some 5,000 years. The Indians reaped a rich harvest of fish and shell fish, gathered shells for making trading wampum, and plied its seemingly endless waterways in their dugout canoes.

The imprint the Indians made was small indeed--so small that evidence of their long tenure is difficult to find. Far different have been their European successors. Great changes have been wrought. Changes are still being made. Yet amid these changes there are still many areas of the Bay that appear virtually untouched. Others look much like they must have in Colonial times. The Chesapeake estuary retains fragments of all the different eras that have occurred from the most primitive to the most modern.

Although the major uses of the Chesapeake have changed little, the techniques by which the uses are effected have undergone considerable modification. Often uses are in direct conflict with each other. However, the estuary is so vast and the uses are so varied that the Bay has accommodated most of them. In the past few decades however, it has become increasingly apparent that even this vast area is being transformed. Some of these changes are hardly evident and others have profound effects far from the locations being changed -- and many are in the best interests of only a few people but at the expense of many.

The population pressure on the Bay is increasing. The Chesapeake estuary is the southern anchor of the Atlantic coastal megalopolis that sprawls from Massachusetts to Virginia. The ports of Baltimore and Hampton Roads, their satellite cities and the others that have developed around the Bay supported 11 million people in 1960 -- a population expected to more than double in the next 40 years. An additional 3 1/2 million people live within a day's drive from the Bay.

Waterborne commerce has always been among the most important

uses for the Chesapeake estuary. Approximately 110 million tons move annually over the waterway and contribute, in large measure, to the economy of an 11 state area, extending into the Midwest, (U.S.D.I., 1970).

The port of Baltimore alone handles nearly 50 million tons annually and if the annual increase in freight traffic in the harbor is maintained, freight traffic tonnage will triple by the year 2000. A recent survey showed that the commercial complex making up the port of Baltimore directs \$1.56 billion a year into Maryland's economy, which represents 11.7 percent of the Maryland gross State product (McHarg, 1972).

The trend in commercial navigation is toward larger ships, which in turn require deeper channels, posing greater problems locating dredge spoil disposal areas. Modifying channel geometry may cause increases in upstream salinity, and unwise disposal of spoil can have marked effects on living marine organisms. It is estimated that the raw sewage discharged into the Bay by ships in transit is equivalent to that of a community of twenty-five thousand people, constantly.

Fishing is another important industry with Bay-wide significance. The region is one of the richest fish and wildlife habitats in the world and as such, it is a most important seafood harvesting area. More than 400 million pounds of fish and shellfish worth \$30 million were taken from Bay waters in 1966. The weight of fish landed was almost triple that of shellfish with nearly 304 million pounds of fish harvested as compared to 125 million pounds of shellfish. But the value of fish was only \$7.3 million, or less than one third of the value of the shellfish which netted \$22.2 million. Oysters alone represented \$15 million, or one half the value of the total fisheries harvest. Of the finfish the menhaden catch was the largest with 243 million pounds worth \$3.9 million.

TABLE I. COMMERCIAL FISHERY 1966

| <u>Type</u> | <u>Pounds</u> | <u>Value</u> |
|-------------|---------------|--------------|
| Finfish | 303.5 mil | \$7.3 mil |
| Oysters | 20 | 15 |
| Clams | 8 | 2.1 |
| Crabs | 95 | 6.8 |

Superimposed on the heavy commercial seafood harvest is a growing recreational fishery. In 1966 it was estimated that Bay anglers caught 22 million pounds of fish and generated about \$10 million in expenditures.

Strategically positioned in the Atlantic Flyway, Chesapeake Bay is very important in the migratory bird pattern. Most of the waterfowl produced on both sides of the James and Hudson Bays all the way up to Greenland funnel into the Chesapeake marshes on their southward migration. As a wintering area for waterfowl, the Chesapeake salt marshes have few equals. More than 75 percent of the wintering population of Atlantic Flyway Canada geese occurs on or near tide water, from Kent County in Delaware to Hyde County in North Carolina. The marshes and grain fields of the Delmarva Peninsula are particularly attractive to Canada geese and to grain feeding black ducks and mallards. In the early fall, home is the Susquehanna flats for huge flocks of American widgeon. Several species of diving ducks including the canvasback, redhead, ring-necked duck, and sometimes, scaup, winter on Chesapeake Bay from the Susquehanna flats south to the confluence of Bay and ocean at the tip of the Delmarva Peninsula. About half of the 80,000 whistling swans in North America winter on the estuaries of Chesapeake Bay and Currituck Sound. Much of the breeding area in the Atlantic Flyway is still wild and remote. It can be counted on to send hundreds of thousands of new birds winging down the flyway each fall. But good wintering areas, adjacent to preferred feeding grounds, are relatively scarce, and as human populations inevitably expand, the size, number, and quality of these wintering areas will diminish accordingly. At present, Chesapeake Bay provides some of the best and most heavily used waterfowl wintering habitat remaining in the Flyway.

The Atlantic Flyway has more than 32 million acres of wetland habitat and 96 percent of it is located from Maryland south. Only 4 million acres are of moderate to high value for waterfowl, and only 2 1/2 million acres are salt-marsh, the type of high-quality waterfowl habitat found in the Chesapeake Bay. Estimates vary, but the bay area encompasses roughly one-third of a million acres of salt-marsh habitat of which about one-quarter of a million acres is of moderate to high value for waterfowl. Public owned wetlands in the Chesapeake Bay area total about 95,000 acres. Most of this habitat too, is high in quality and supports large populations of wintering birds. An additional 55,000 acres of quality marsh is owned and managed by approximately 380 private waterfowl hunting clubs. Thus, about 150,000 acres or approximately half of the salt-marsh in Chesapeake Bay is managed specifically for waterfowl and is likely to continue to be managed for this purpose in the foreseeable future.

In recent years, Chesapeake Bay has wintered approximately 550,000 ducks and 350,000 geese which provided an estimated 250,000 man-days of waterfowl hunting and 275,000 birds in the bag. Nearly 100,000 Canada geese, the king of waterfowl, are harvested on Chesapeake Bay, the queen of bays (USDI, 1970).

Erosion and siltation constitutes a significant problem for the Bay region. The earth lost from the land to the Bay has hurt the farmers who need the soil for their crops, the shippers whose vessels must navigate shoaling channels, and the fishermen whose aquatic harvest is being stifled and lost.

Evidence derived from early charts and maps, from historical documents, and from field studies and borings indicates that the rate of sedimentation in different portions of the Chesapeake Bay has varied over historic time. Prior to settlement by colonists and the initiation of land clearing and agriculture, rates of sediment contribution from land under forest cover were perhaps on the order of 100 tons/sq.mi./yr. However, with the advent of extensive clearing for agriculture, these rates rose rapidly to values of 400 to 800 tons/sq.mi./yr. As early as the latter part of the seventeenth century visitors to colonial America noted both the erosion of the fields and the muddy character of the freshets. In addition, they observed the rapid siltation taking place in a number of the early colonial harbor and river towns (State of Maryland, 1968).

The Potomac and Susquehanna Rivers transport the major sediment loads deposited within the Chesapeake Bay system. The sediment contribution of the Susquehanna is considerably moderated by the hydroelectric dams between Harrisburg, Pennsylvania, and Conowingo, Maryland, in that these reservoirs trap a significant amount of sediment moving downstream. The Susquehanna watershed is estimated to supply some 600 thousand tons per year, or approximately 23 tons per square mile. The largely unregulated Potomac River Basin, on the other hand, contributes an estimated 2.5 million tons per year to the estuarine system. This is approximately 170 tons per square mile (Corps, 1970).

The fact that each tributary entering the Chesapeake Bay deposits the bulk of its sediment load in the vicinity of its entrance to the Bay constitutes an obvious economic "fact of life" for the economy of the Bay itself. Perhaps the most striking illustration is provided by the Potomac and the Anacostia Rivers in the vicinity of the nation's capitol where channel improvement and dredging operations have been virtually continuous since 1804. Much of the land adjacent to the river including Haynes Point, the parkland along the Anacostia River, and the National Airport are all made of sediments dredged from the rivers. It is estimated that the annual cost of dredging on the Potomac is on the order of \$150,000 per year (State of Maryland, 1968).

Recently it has become evident that increasing urbanization and accompanying construction activities on the landscape may contribute immense quantities of sediment to local areas. It is estimated that of the million tons per year in the Potomac at Washington, approxi-

mately 25-30 percent is derived from construction sites in the metropolitan region. Inasmuch as population can be expected to continue to burgeon in many areas surrounding the Chesapeake Bay, construction activities can also be expected to increase. This in turn will transform the landscape and may lead to the addition of uncontrolled quantities of silt to the estuarine tributaries (State of Maryland, 1968).

Shoreline erosion also contributes to the silt load and is the single most dramatic, and most readily apparent geomorphological process occurring in the Bay. Historical data, though somewhat spotty, provides some perspective. It has been estimated that, along the 230 miles of Maryland's primary Bay shoreline, some 6,000 acres of land have been lost to the sea between 1845 and 1942. Recent rates of erosion loss are estimated to be approximately 0.17 acres/mile/year in the northern Bay area and 0.34 acres/mile/year in Maryland's southern Bay portion. To illustrate the variability of erosion loss rates estimated between 1845 and 1942, the Cecil-Somerset County shoreline losses were estimated to be 0.13 acres/mile/year, while Dorchester County losses were estimated to be of the order of 0.64 acres/mile/year. It must be emphasized that land area losses do not indicate volumes of material handled, because of the differential in land elevation of various areas of Bay frontage.

The present and anticipated future social and economic development of the Chesapeake Bay Basin, with the estimated large increase in population, emphasizes the vulnerability of the Bay's sensitive estuarine system to the future works of man. In particular, the waste discharges of man's commerce and activity have a growing impact on the Bay. These waste loads are derived from municipal, industrial and agricultural sources.

Agricultural pollutants consist primarily of silt, fertilizer, insecticides, herbicides, and animal wastes. Industrial wastes contain a wide assortment of detrimental material ranging from sand and gravel wastes and heavy metals through complex chemical compounds and mine waste. Many of the latter waste types are toxic to both aquatic biota and man. Municipal discharges contain human wastes and a huge panorama of household and industrial by-products, and often inject significant bacterial loads into the aquatic environment, infecting both finfish and shellfish, making them potentially dangerous and therefore unfit for human consumption.

Gross estimates indicate that pollution affects some 400,000 acres of finfish habitat and 42,000 acres of shellfish habitat in Chesapeake Bay. Municipal and domestic discharges cause the major pollution problem.

There are other significant threats to the Chesapeake Bay environment. These include both inter- and intra-basin diversions

of freshwater. The determination of the effects of upstream management of the fresh water resource on the marine environment have only recently become of concern to oceanographers and marine biologists. Current examples of this problem in Chesapeake Bay are (1) the deepening of the Chesapeake and Delaware Canal, which will increase the net amount of water flowing from the head of Chesapeake Bay into Delaware Bay from about 900 cubic feet per second to about 2100 cubic feet per second, and (2) the Baltimore Water Supply Tunnel which taps the Susquehanna River above Conowingo Dam. Fresh water diversions can alter the salinity regime of the headwaters of the Bay, affecting the spawning opportunity of many species of fish. Further study of these problems will undoubtedly reveal presently unknown ecological ramifications of the estuary's struggle to reach and maintain suitable equilibrium in the wake of the incursions of man (Corps, 1970).

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APPENDIX B

BIOTIC COMMUNITIES OF THE CHESAPEAKE BAY REGION

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BIOTIC COMMUNITIES OF THE CHESAPEAKE BAY¹INTRODUCTION

This report presents a summary of the characteristic biota and biotic communities of the Chesapeake Bay region, defined in terms of typical vegetation, associated animal species, and critical environmental factors. The plant species listed are the dominant or characteristic species typical of the various biotic communities. The animal species lists are more extensive and include the common and/or characteristic species associated with each biotic community.

The ecology of the Chesapeake Bay region has been influenced strongly by the presence of civilized man. But even before the colonists had set foot on the continent, Indians had made their presence known. Fire was an often used tool of the Indians for hunting purposes and clearing land.

Following colonization by white men, more intensive land clearing occurred during the eighteenth and early part of the nineteenth centuries. Lumber was needed for shelter and firewood and the settlers brought their European agricultural system with them. Virgin land was so plentiful that a shifting form of agriculture with little care for the soil became prevalent. Tobacco depleted much of the soil of its nutrients and when fields were abandoned, erosion quickly exhausted the topsoil. At the time of the Civil War, labor became scarce and much of the previously cultivated land was abandoned. These abandoned fields were invaded by loblolly pine Pinus taeda, pitch pine Pinus rigida and scrub pine Pinus virginiana. These species are typical pioneer tree species in old field or secondary succession.

Pine forests, although common, are not the climax vegetation but are dominant due to a history of disturbances including fire, agriculture and lumbering. Braun (1950) indicates

¹ The information for this appendix has been taken from a report by the author on the "Atlantic Coastal Plain Natural Region Survey" written for a contract with the National Park Service's Natural Landmarks Program. This report was edited by the principal investigator and author by extracting those portions relevant to the Chesapeake Bay region. This report has certain shortcomings primarily relating to the difference in scope of the two reports; the larger Atlantic Coastal Plain region versus the more circumscribed Chesapeake Bay region.

that the Chesapeake Bay region should actually be considered an Eastern Oak-Hickory Forest region due to the dominance of oaks Quercus spp. and hickories Carya spp. in the climax communities.

The following is a breakdown of the major plant community types occurring in the Chesapeake Bay region with an indication of some of the critical environmental factors (limiting factors) controlling the community. After each description of a plant community type, some of the typical animal species associated with it are listed.

Aquatic Ecosystems

The northern portion of the Atlantic Coastal Plain is characterized by drowned river valleys, the best example of which is the Chesapeake Bay. The Chesapeake Bay is a unique estuary comprised of the drowned Susquehanna River Valley and several of its tributaries. The bay is unique because of its size and isolation from the Atlantic Ocean.

Salt Marsh

The salt marsh community is here divided into two different phases, the regularly flooded phase, and the irregularly flooded phase. Salt marsh develops in the low areas where inundation by salt water is frequent enough to prevent the survival of non-salt-tolerant species. The vegetation is dominated by various grasses and sedges. Woody species occur only on the higher ridges in this community.

The regularly flooded salt marshes occur along the open ocean and in the shallow sounds behind barrier islands. They are inundated twice daily to a depth of six inches or more by the highly saline waters of normal high tides. The flushing action of the tides is essential to this salt marsh community. It brings in certain nutrients from the surrounding estuary and flushes out toxic waste materials. Tidal creeks meander through the salt marsh and are rich in silt and organic debris from inland runoff. This provides additional nutrient supply to the surrounding marshes.

The regularly flooded salt marshes are generally dominated by saltmarsh cordgrass Spartina alterniflora. Saltmeadow cordgrass Spartina patens, salt grass Distichlis spicata, black needlerush Juncus roemerianus and glasswort Salicornia spp. are usually abundant. Along the more elevated ridges of the marsh, groundsel Baccharis halimifolia, marsh elder Iva frutescens, sea oxeye Borrichia frutescens, and sea lavender Limonium spp. occur.

The variations in drainage and salinity account for rather distinct plant zonation and distribution.

Irregularly flooded salt marshes occur along the shores of bays, sounds, and rivers. They are flooded only irregularly by wind and storm tides with from a few inches to several feet of water. Tidal creeks also dissect the irregularly flooded salt marshes but are typically shorter and straighter than those of the regularly flooded salt marshes. The water in these tidal creeks generally is less rich in organic debris and silt.

The vegetation is largely dominated by black needlerush Juncus roemerianus with saltmeadow cordgrass Spartina patens, salt grass Distichlis spicata, glasswort Salicornia spp. and saltmarsh three-square Scirpus robustus occurring as common associates. On ridges of high ground, marsh elder Iva frutescens and groundsel Bacharis halimifolia are common. Switchgrass Panicum virgatum may occur over large areas adjacent to the upland along with sea lavender Limonium spp. and sea oxeye Borrchia frutescens.

Typical animals include:

Horseshoe crab Limulus polyphemus
 Fiddler crabs Uca spp.
 Marsh crab Sesarma reticulatum
 Saltmarsh snail Melampus bidentatus
 Periwinkle snail Littorina irrorata
 Ribbed mussel Volselfa demissa
 Stinkpot Sternotherus odoratus
 Diamondback terrapin Malaclemys terrapin
 Water snake Natrix sipedon
 Eastern hognose snake Heterodon platyrhinos
 Canada goose Branta canadensis
 Snow goose Chen hyperborea
 Mallard Anas platyrhynchos
 Black duck Anas rubripes
 Pintail Anas acuta
 Blue winged teal Anas discors
 American widgeon Mareca americana
 Shoveler Spatula clypeata
 Herons
 Egrets
 Marsh hawk Circus cyaneus
 Sparrow hawk Falco sparverius
 Clapper rail Rallus longirostris
 Short eared owl Asio flammeus
 Sharp tailed sparrow Ammospiza caudacuta
 Seaside sparrow Ammospiza maritima

Opossum Didelphis marsupialis
 Least Shrew Cryptotis parva
 Least cottontail Sylvilagus floridanus
 Rice rat Oryzomys palustris
 Meadow vole Microtus pennsylvanicus
 Muskrat Ondatra zibethicus
 Raccoon Procyon lotor
 Mink Mustela vison
 River otter Lutra canadensis
 White tailed deer Odocoileus virginianus

Critical environmental factors in the salt marsh include salinity, frequency of inundation, and nutrient input and flushing action of the tides.

Brackish Marsh

The brackish marsh community develops in the transition zone between freshwater and salt marshes. Brackish marshes are located along bays and coastal rivers and are irregularly inundated by high winds and storms.

Several different plant associations are characteristic of this major community type. A short form of saltmarsh cordgrass Spartina alterniflora usually dominates the well drained areas. In the more poorly drained depressions, Olney's three-square Scirpus olneyi dominates with salt grass Distichlis spicata and black needlerush Juncus roemerianus occurring more abundantly along the better drained edges of such depressions. The taller form of salt-marsh cordgrass Spartina alterniflora may be found in abundance adjacent to tidal creeks, while saltmeadow cordgrass Spartina patens dominates in well drained soils adjacent to pond and creek borders. In the more elevated and drier areas, groundsel Baccharis halimifolia and marsh elder Iva frutescens are common. Other important plants in brackish marshes include widgeongrass Ruppia maritima, atriplex Atriplex patula, sea lavender Limonium carolinianum, seashore mallow Kosteletskyia virginica and glasswort Salicornia spp.

Typical animals include:

Mud crabs Xanthidae
 Blue crab Callinectes sapidus
 Saltmarsh snail Melampus bidentatus
 Periwinkle snail Littorina irrorata
 Canada goose Branta canadensis
 Mallard Anas platyrhynchos
 Black duck Anas rubripes

Pintail Anas acuta
Blue winged teal Anas discors
Green winged teal Anas carolinensis
Gadwall Anas strepera
American widgeon Mareca americana
Shoveler Spatula clypeata
Hooded merganser Lophodytes cucullatus
Osprey Pandion haliaetus
King rail Rallus elegans
Short eared owl Asio flammeus
Opossum Didelphis marsupialis
Least shrew Cryptotis parva
Eastern cottontail Sylvilagus floridanus
Rice rat Oryzomys palustris
Meadow vole Microtus pennsylvanicus
Muskrat Ondatra zibethicus
Raccoon Procyon lotor
Mink Mustela vison
River otter Lutra canadensis
White tailed deer Odocoileus virginianus

Critical environmental factors include amount of salinity, frequency of inundation, and depth of water.

Freshwater Marsh

As with the salt marsh community, the freshwater community is divided into two phases, the coastal freshwater marsh phase and the inland freshwater marsh phase. The primary source of water for these marshes is precipitation and runoff via rivers and streams and thus a totally different type of community develops.

The coastal freshwater marsh phase occurs along rivers and streams where there is little or no tidal action as well as in interdunal areas. The water is fresh or slightly brackish and ranges in depth from ground level to several feet. A great diversity of plants is distributed in these marshes in response to variation in depth of water and salinity.

In areas where water is usually fresh, plants such as cattail Typha spp., wildrice Zizania aquatica, sawgrass Cladium spp., pickerelweed Pontederia cordata, and waterlily Nymphaea odorata may form extensive stands. In the more brackish areas, species characteristic of the more saline environments occur including tall cordgrass Spartina cynosuroides and Olney's threesquare Scirpus olneyi. Other typical species of the coastal freshwater marsh are smartweeds Polygonum spp., spikerushes Eleocharis spp., sedges

Carex spp., phragmites Phragmites communis, arrowhead Sagittaria spp., bulrushes Scirpus spp., pondweeds Potamogeton spp., button-bush Cephalanthus occidentalis, jewelweeds Impatiens spp. and alders Alnus spp.

The inland freshwater marsh phase is characterized by many of the same species but forms in shallow lake basins, limestone sinks sloughs, or at the borders of open water. The soil is water-logged and may be covered by three feet or more of freshwater. Cattails, pondweeds, bulrushes, arrowheads, smartweeds, sedges and water lilies again are very important constituents of the marsh. However, in the inland marshes, grasses Poaceae, rushes Juncus spp., watermilfoils Myriophyllum spp., duckweeds Lemna spp., and spatterdock Nuphar luteum occur, often in great abundance, choking off open water areas.

Corresponding with the high diversity of plant species is a high diversity of animal species.

Typical animals include:

Spotted salamander Ambystoma maculatum
 Tiger salamander Ambystoma tigrinum
 Spotted newt Notophthalmus viridescens
 Fowler's toad Bufo woodhousei fowleri
 American toad Bufo americanus
 Tree frogs Hyla spp.
 Chorus frogs Pseudacris spp.
 Cricket frog Acris gryllus
 Leopard frog Rana pipiens
 Bull frog Rana catesbeiana
 Green frog Rana clamitans
 Snapping turtle Chelydra serpentina
 Eastern mud turtle Kinosternon subrubrum
 Stinkpot turtle Sternotherus odoratus
 Spotted turtle Clemmys guttata
 Bog turtle Clemmys muhlenbergi
 Painted turtle Chrysemys picta
 Water snake Natrix sipedon
 Eastern ribbon snake Thamnophis sauritus
 Great blue heron Ardea herodias
 Mallard Anas platyrhynchos
 Southern bald eagle Haliaeetus leucocephalus
leucocephalus
 Marsh hawk Circus cyaneus
 Osprey Pandion haliaetus
 King rail Rallus elegans
 Sora Porzana carolina

Common gallinule Gallinula chloropus
 Coot Fulica americana
 Short eared owl Asio flammeus
 Belted kingfisher Megaceryle alcyon
 Tree swallow Iridoprocne bicolor
 Long billed marsh wren Telmatodytes palustris
 Yellowthroat Geothypis trichas
 Red winged blackbird Agelaius phoeniceus
 Meadowlark Sturnella magna
 Song sparrow Melospiza melodia
 Swamp sparrow Melospiza georgiana
 Opossum Didelphis marsupialis
 Masked shrew Sorex cinereus
 Star nosed mole Condylura cristata
 Eastern cottontail Sylvilagus floridanus
 Beaver Castor canadensis
 Rice rat Oryzomys palustris
 Meadow vole Microtus pennsylvanicus
 Muskrat Ondatra zibethicus
 Red fox Vulpes fulva
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Mink Mustela vison
 Striped skunk Mephitis mephitis
 River otter Lutra canadensis
 White tailed deer Odocoileus virginianus

Critical environmental factors in the freshwater marsh include depth of water, salinity, rate of siltation, turbidity of the water and competition for light and space.

Bog

Bog communities are divided into two different phases, sphagnum bogs and cedar swamps. All bogs have several features in common. They generally develop in areas where drainage is restricted, all have a surface layer of cushion-like vegetation, and all have an accumulation of peat. The decidedly acid condition of bogs limits the species which can persist here.

Sphagnum bogs are more typical of the mountain region and the far north, however, particularly in the northern section of the Atlantic Coastal Plain, they occur scattered across the landscape. Very few sphagnum bogs have persisted in the Chesapeake Bay region. The vegetation is generally low to the ground with the exception of some scattered shrubs and trees. Two mosses Sphagnum and Hypnum dominate the bog by creating a covering over the entire surface. Other species scattered through the bog include buckbean Menyanthes trifoliata, cotton grass Eriophorum spp., numerous sedges Carex spp., cranberry Vaccinium macrocarpon, sweet gale Myrica gale, bog

rosemary Andromeda glaucophylla, leatherleaf Chamaedaphne calyculata and Labrador tea Ledum groenlandicum. Insectivorous plants including pitcher plants Sarracenia purpurea, sundews Drosera spp. and bladderworts Utricularia spp. also occur in this rather unique community (Smith, 1966).

Cedar swamps are bogs dominated by dense, generally even-aged stands of Atlantic Coastal Plain from New Jersey north. While sphagnum bogs are usually small, cedar swamps may be extensive as in sections of the Pocomoke River swamp. Pitch pine Pinus rigida is widely scattered while red maple Acer rubrum, black gum Nyssa sylvatica, and sweet bay Magnolia virginiana form a dense understory. Other typical shrub species include highbush blueberry Vaccinium corymbosum, fetterbush Leucothoe spp. clammy azalea Rhododendron viscosum and bayberry Myrica pennsylvanica. The herbaceous ground cover includes chain fern Woodwardia virginica, bladderworts Utricularia spp., pitcher plant Sarracenia purpurea, swamp pink Calopogon pulchellus, and partridgeberry Mitchella repens which are generally rather common.

Typical animals include:

Bull frog Rana catesbeiana
 Green frog Rana clamitans
 Carpenter frog Rana virgatipes
 Bog turtle Clemmys muhlenbergi
 Water snake Natrix sipedon
 Bobwhite quail Colinus virginianus
 Turkey Meleagris gallopava
 Woodcock Rhizophila minor
 Mourning dove Zenaidura macroura
 Eastern wood pewee Contopus virens
 Wood thrush Hylocichla mustelina
 Parula warbler Parula americana
 Hooded warbler Wilsonia citrina
 Opossum Didelphis marsupialis
 Masked shrew Sorex cinereus
 Star nosed mole Condylura cristata
 Eastern cottontail Sylvilagus floridanus
 Beaver Castor canadensis
 Red-backed vole Clethrionomys gapperi
 Meadow vole Microtus pennsylvanicus
 Muskrat Ondatra zibethicus
 Red fox Vulpes fulva
 Gray fox Urocyon cinereoargenteus

Black bear Ursus americanus
 Raccoon Procyon lotor
 Mink Mustela vison
 River otter Lutra canadensis
 White tailed deer Odocoileus virginianus

Critical environmental factors in this community include frequency and severity of fire, duration of flooding and amount of peat or elevation.

Cypress-Gum Swamp Forest

The cypress-gum swamp forest is probably the most characteristic community of the South. It reaches its northern distribution in the Chesapeake Bay region occurring in several isolated areas such as Battle Creek Cypress swamp. In deeper swamps where the land is flooded almost continuously, baldcypress Taxodium distichum and/or water tupelo Nyssa aquatica will exist without associates, although water tupelo is much less tolerant of flooding than is baldcypress (Penfound, 1952). This community represents some of the wildest country remaining in the Atlantic Coastal Plain. Several of the larger predators persist in these swamps.

Typical animals include:

Pine woods tree frog Hyla femoralis
 Green tree frog Hyla cinerea
 Bull frog Rana catesbeiana
 Snapping turtle Chelydra serpentina
 Eastern mud turtle Kinosternon subrubrum
 Stinkpot Sternotherus odoratus
 Spotted turtle Clemmys guttata
 Painted turtle Chrysemys picta
 Water snake Natrix sipedon
 Eastern hognose snake Heterodon platyrhinos
 Double crested cormorant Phalacrocorax auritus
 Common egret Casmerodius albus
 Black crowned night heron Nycticorax nycticorax
 Wood duck Aix sponsa
 Red shouldered hawk Buteo lineatus
 Woodcock Philohela minor
 Barred owl Strix varia
 Pileated woodpecker Hylatomus pileatus
 Acadian flycatcher Empidonax virescens
 Prothonotary warbler Protonotaria citrea
 Cardinal Richmondia cardinalis
 Opossum Didelphis marsupialis

Eastern cottontail Sylvilagus floridanus
 Gray squirrel Sciurus carolinensis
 Flying squirrel Glaucomys volans
 Beaver Castor canadensis
 Gray fox Urocyon cinereoargenteus
 Black bear Ursus americanus
 Raccoon Procyon lotor
 Mink Mustela vison
 River otter Lutra canadensis
 Bobcat Lynx rufus
 White tailed deer Odocoileus virginianus

Critical environmental factors include depth of water, duration of flooded condition, amount of peat developed, and occurrence of fire.

Land Ecosystems

Dune Community

This major community type fringes the Atlantic Ocean encompassing the frontal dune complex which extends from the ocean side base of the foredune, inland through the often closely spaced, smaller, hummocky dunes.

The community is usually dominated by perennial grasses with an occasional shrub or wind-shorn tree in protected areas. All of the species which persist here must have a certain degree of physiological salt tolerance to both salt spray and substrate salinity. They also must be able to withstand high winds and sand blasts, possess drought resistance, and be able to tolerate low levels of certain nutrients such as nitrogen. Physiologically, this is perhaps the harshest environment in the Atlantic Coastal Plain.

Due to this harsh environment, the vegetation is sparse with sea rocket Cakile spp., pigweed Amaranthus pumila and saltwort Salsola kali occurring on the beach and several grasses dominating on the dunes. American beachgrass Ammophila breviligulata, salt-meadow cordgrass Spartina patens, silver bunchgrass Panicum amarulum and running beachgrass Panicum amarum are the dominant grasses in the dune community. Herbaceous species gaining importance behind the foredune include beach pea Strophostyles helvola, sandbur Cenchrus tribuloides, seaside spurge Euphorbia polygonifolia and various broomsedges Andropogon spp.

Typical animals include:

Horseshoe crab Limulus polyphemus
 Ghost crab
 Coquina clam

Six lined racerunner Chemidophorus sexlineatus
 Eastern hognose snake Heterodon platyrhinos
 Black racer Coluber constrictor
 Black rat snake Elaphe obsoleta
 Sparrow hawk Falco sparverius
 Plovers Charadrius spp. and Squatarola squatarola
 Turnstone Arenaria interpres
 Willet Catoptrophorus semipalmatus
 Sanderling Crocethia alba
 Gulls Larus spp.
 Terns Sterna spp.
 Horned lark Eremophila alpestris
 Savanna sparrow Passerculus sandwichensis
 Ipswich sparrow Passerculus princeps
 Eastern cottontail Sylvilagus floridanus
 White footed mouse Peromyscus leucopus
 House mouse Mus musculus
 Meadow jumping mouse Zapus hudsonius

The critical environmental factors in this community include high salinity (salt spray and substrate salinity), drought conditions (due to sandy soils, high winds, and high solar radiation), and low nutrient availability.

Maritime Shrub Thicket

This community occupies the area behind the dune community and is characterized by a dense growth of low shrubs, often tangled with numerous lianas. Usually the closed cover of the shrub thicket begins abruptly, with the shrubs massed on the ocean side of old dunes. The first shrubs are commonly prostrate and become progressively taller inland. The tops of these shrubs are closely sheared by wind-borne salt spray and form a smooth, compact surface gradually increasing in height inland.

The dominant plants in this community include common wax myrtle Myrica cerifera, groundsel Baccharis halmifolia, shining sumac Rhus copallina redcedar Juniperus virginiana and marsh elder Iva frutescens. Important vines include Virginia creeper Parthenocissus quinquefolia, poison ivy Rhus radicans, green briar Smilax spp. and wild grape Vitis spp. Bayberry Myrica pennsylvanica, as well as highbush blueberry Vaccinium corymbosum are important shrub species (Higgins et. al., 1971.)

Typical animals include:

Toads Bufo spp.
 Tree frogs Hyla spp.
 Six lined racerunner Cnemidophorus sexlineatus

Eastern hognose snake Heterodon platyrhinos
 Black racer Coluber constrictor
 Yellow shafted flicker Colaptes auratus
 Mockingbird Mimus polyglottus
 Prairie warbler Dendroica discolor
 Red winged blackbird Agelaius phoeniceus
 Boat tailed grackle Cassidix mexicanus
 Meadowlark Sturnella magna
 Towhee Pipilo erythrophthalmus
 Opossum Didelphis marsupialis
 Eastern cottontail Sylvilagus floridanus
 White footed mouse Peromyscus leucopus
 Meadow jumping mouse Zapus hudsonius
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Mink Mustela vison

The critical environmental factors in this community are basically the same as those of the dune community, however, they are less severe due to the protection afforded by the foredune complex.

Maritime Forest

This community type develops immediately behind the maritime shrub thicket community and consists of closely spaced trees. It occurs on the mainland and/or on offshore islands and barrier beaches. Although protected to some extent by large dunes and maritime shrub thicket, it is strongly influenced by salt spray blown in from the Atlantic Ocean (Wells, 1939; Boyce, 1954).

The community is dominated by redcedar Juniperus virginiana, holly Ilex opaca, bear oak Quercus ilicifolia and pitch pine Pinus rigida. (Harshberger, 1900).

Maritime forest normally develops on old dune systems and interdunal freshwater marshes and ponds are common. The presence of this freshwater supply allows for large populations of wildlife, many species not normally associated with forest communities.

Typical animals include:

Snapping turtle Chelydra serpentina
 Eastern mud turtle Kinosternon subrubrum
 Spotted turtle Clemmys guttata
 Ground skink Lygosoma laterale
 Five lined skink Eumeces fasciatus
 Water snake Natrix sipedon
 Eastern hognose snake Heterodon platyrhinos

Black racer Coluber constrictor
 Black rat snake Elaphe obsoleta
 Diamondback rattlesnake Crotalus adamanteus
 Sharp shinned hawk Accipiter striatus velox
 Red shouldered hawk Buteo lineatus
 Red tailed hawk Buteo jamaicensis
 Whip poor will Caprimulgus vociferus
 Crested flycatcher Myiarchus crinitus
 Carolina wren Thryothorus ludovicianus
 White eyed vireo Vireo griseus
 Red eyed vireo Vireo olivaceus
 Parula warbler Parula americana
 Yellow throated warbler Dendroica dominica
 Pine warbler Dendroica pinus
 Cardinal Richmondia cardinalis
 Opossum Didelphis marsupialis
 Gray squirrel Sciurus carolinensis
 White footed mouse Peromyscus leucopus
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Mink Mustela vison
 White tailed deer Odocoileus virginianus

The critical environmental factors controlling this community are basically the same as those of the previous two communities, namely, high salinity, drought conditions, and low nutrient availability. However, this community has much less severe conditions than the previous communities discussed.

Pine Flatwoods

In the northern portion of the Atlantic Coastal Plain loblolly pine Pinus taeda, and pitch pine Pinus rigida become the dominants of the coastal flatwoods. Loblolly pine is particularly important in Virginia while pitch pine dominates in Maryland. The pine flatwoods are generally rather open with an incomplete canopy but often have a diverse shrub and herb zone.

Typical animals include:

Eastern spadefoot Scaphiopus holbrookii
 Pine woods tree frog Hyla femoralis
 Green tree frog Hyla cinerea
 Box turtle Terrapene carolina
 Fence lizard Sceloporus undulatus
 Six lined racerunner Cnemidophorus sexlineatus
 Ground skink Lygosoma laterale
 Five lined skink Eumeces fasciatus
 Cornsnake Elaphe guttata

Diamondback rattlesnake Crotalus adamanteus
 Red tailed hawk Buteo jamaicensis
 Broad winged hawk Buteo platypterus
 Bobwhite quail Colinus virginianus
 Mourning dove Zenaidura macroura
 Great horned owl Bubo virginianus
 Yellow shafted flicker Colaptes auratus
 Hairy woodpecker Dendrocopus villosus
 Downy woodpecker Dendrocopus pubescens
 Red cockaded woodpecker Dendrocopus borealis
 Brown headed nuthatch Sitta pusilla
 Eastern bluebird Sialia sialis
 Yellow throated warbler Dendroica dominica
 Pine warbler Dendroica dominica
 Pine warbler Dendroica pinus
 Prairie warbler Dendroica discolor
 Meadowlark Sturnella magna
 Towhee Pipilo erythrophthalmus
 Pine woods sparrow Aimophila aestivalis
 Opossum Didelphis marsupialis
 Eastern cottontail Sylvilagus floridanus
 Pine mouse Pitymys pinetorum
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Bobcat Lynx rufus
 White tailed deer Odocoileus virginianus

Critical environmental factors governing the composition of this community include frequency of fire, drainage, and lack of local relief.

Bottomland Hardwood Forest

This community type is one of the most diverse terrestrial plant communities in the Atlantic Coastal Plain and is again, best developed in the southern section of that province. It occupies the floodplains of the major rivers, and is closely associated with the cypress-gum swamp forest.

Behind a natural levee, three types of minor relief occur, low ridges, flats, and sloughs. The presence of a clay pan restricts drainage behind the levee and the flats and sloughs are flooded for varying lengths of time. Cypress-gum swamp forest occupies the sloughs and flats which remain flooded for long periods. The low ridges, however, being a few feet above the normal flood level are inundated only occasionally. Bottomland hardwood forest develops on these ridges and on the higher flats. On older floodplain terraces or second bottoms, this forest community attains its best development (Putnam et. al., 1960).

Typically the most important trees are sweetgum Liquidambar styraciflua, white oak Quercus alba, swamp chestnut oak Quercus michauxii, laurel oak Quercus laurifolia, water oak Quercus nigra, willow oak Quercus phellos, overcup oak Quercus lyrata, pin oak Quercus palustris, Nuttall oak Quercus nuttalli, water ash Fraxinus caroliniana, winged elm Ulmus alata, American elm Ulmus americana, swamp tupelo Nyssa sylvatica var. biflora, red maple Acer rubrum, loblolly pine Pinus taeda and hackberry Celtis laevigata. Early successional stages, occurring close to the river, are dominated by cottonwood Populus deltoides and heterophylla and black willow Salix nigra.

Hotchkiss and Stewart (1947) indicate that beech Fagus grandifolia dominates in the mature bottomland hardwood forests of Maryland. On the smaller floodplains, especially in the northern section of the Atlantic Coastal Plain, river birch Betula nigra, sycamore Platanus occidentalis, box elder Acer negundo and silver maple Acer saccharinum dominate the stream sides.

The floodplain soils are quite rich due to the frequent addition of alluvium. Farmers have cleared much of the best drained bottomlands for cultivation and have reaped great benefits from this land. This, must be considered as a major threat to the survival of this forest as a community type.

Animal species are also quite abundant in this community due to the presence of a large supply of foods.

Typical animals include:

Two lined salamander Eurycea bislineata
 Fowler's toad Bufo woodhousei fowleri
 Squirrel tree frog Hyla squirella
 Pine woods tree frog Hyla femoralis
 Green tree frog Hyla cinerea
 Bull frog Rana catesbeiana
 Box turtle Terrapene carolina
 Broad headed skink Eumeces laticeps
 Water snake Natrix sipedon
 Eastern hognose snake Heterodon platyrhinos
 Wood duck Aix sponsa
 Red shouldered hawk Buteo lineatus
 Bobwhite quail Colinus virginianus
 Turkey Meleagris gallopavo
 Woodcock Philohela minor
 Barred owl Strix varia

Pileated woodpecker Hylatomus pileatus
 Red headed woodpecker Melanerpes erythrocephalus
 Acadian flycatcher Empidonax virescens
 Prothonotary warbler Protonotaria citrea
 Cardinal Richmondia cardinalis
 Opossum Didelphis marsupialis
 Eastern cottontail Sylvilagus floridanus
 Gray squirrel Sciurus carolinensis
 Fox squirrel Sciurus niger
 Flying squirrel Glaucomys volans
 Beaver Castor canadensis
 Gray fox Urocyon cinereoargenteus
 Black bear Ursus americanus
 Raccoon Procyon lotor
 Mink Mustela vison
 River Otter Lutra canadensis
 Bobcat Lynx rufus
 White tailed deer Odocoileus virginianus

Critical environmental factors controlling the composition of this community include duration of flooding, elevation and drainage of soil, occurrence of fire and length of time covered with vegetation.

Upland Pine Forest

This community type is here divided into two phases, loblolly pine-shortleaf pine phase and pitch pine phase. The overall importance of this community in the uplands of the Atlantic Coastal Plain reflects the history of disturbance in this region. The community is successional in nature, being comprised of a canopy of pines Pinus spp. and an understory of hardwoods usually dominated by oaks Quercus spp.

The loblolly pine-shortleaf pine phase occupies the disturbed upland habitats and is definitely successional. It is generally associated with soils which possess more clay than the soils in the pine flatwoods which are generally quite sandy. Loblolly pine Pinus taeda in particular is the first tree species to invade abandoned lands. It may dominate the forest for more than 80 years before the climax hardwoods become dominant (Oosting, 1942). Shortleaf pine Pinus echinata, also a pioneer species, attains its best development in the drier habitats as on ridge tops. Except in the youngest stands, an understory of mixed hardwoods including white oak Quercus alba, scarlet oak Quercus coccinea, red oak Quercus rubra, black oak Quercus velutina, post oak Quercus stellata, southern red oak Quercus falcata, water oak Quercus nigra,

mockernut hickory Carya tomentosa, pignut hickory Carya glabra, black gum Nyssa sylvatica and sweetgum Liquidambar styraciflua occurs. Often the hickories appear late in succession. Scrub pine Pinus virginiana is also an important pioneer species, particularly in the northern portion of the Chesapeake Bay region.

The pitch pine phase dominates the disturbed uplands from Maryland north to Cape Cod along the Atlantic Coastal Plain. Associated with the pitch pine are blackjack oak Quercus marylandica, post oak Quercus stellata, black oak Quercus velutina and scarlet oak Quercus coccinea. The scrub oak Quercus ilicifolia is also a common associate on the drier sites. (McCormick, 1970).

Typical animals include:

Dusky salamander Desmognathus fuscus
 Red backed salamander Plethodon cinereus
 Slimy salamander Plethodon glutinosus
 Eastern spadefoot Scaphiopus holbrookii
 Fowler's toad Bufo woodhousei fowleri
 Box turtle Terrapene carolina
 Fence lizard Sceloporus undulatus
 Six lined racerunner Cnemidophorus sexlineatus
 Ground skink Lygosoma laterale
 Eastern garter snake Thamnophis sirtalis
 Eastern hognose snake Heterodon platyrhinos
 Black racer Coluber constrictor
 Eastern coachwhip Mastigophis flagellum
 Corn snake Elaphe guttata
 Black rat snake Elaphe obsoleta
 Pine snake Pituophis melanoleucus
 Copperhead Agkistrodon contortrix
 Timber rattlesnake Crotalus horridus
 Bobwhite quail Colinus virginianus
 Screech owl Otus asio
 Great horned owl Bubo virginianus
 Ruby throated hummingbird Archilochus colubris
 Eastern wood pewee Contopus virens
 Carolina chickadee Parus carolinensis
 Blue gray gnatcatcher Polioptila caerulea
 White eyed vireo Vireo griseus
 Pine warbler Dendroica pinus
 Summer tanager Piranga rubra
 Cardinal Richmondia cardinalis
 Field sparrow Spizella pusilla
 Opossum Didelphis marsupialis
 Masked shrew Sorex cinerea

Short tailed shrew Blarina brevicauda
 Common mole Scalopus aquaticus
 Eastern cottontail Sylvilagus floridanus
 Gray squirrel Sciurus carolinensis
 Fox squirrel Sciurus niger
 Red squirrel Tamiasciurus hudsonicus
 Flying squirrel Glaucomys volans
 White fotted mouse Peromyscus leucopus
 Meadow vole Microtus pennsylvanicus
 Pine vole Pitymys pinetorum
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Bobcat Lynx rufus
 White tailed deer Odocoileus virginianus

Critical environmental factors determining the vegetational composition in this community include frequency of distrubance, water holding capacity of the soil, and frequency of fire.

Upland Hardwood Forest

This vegetational type is considered to be the climax vegetation in the upland regions of the Atlantic Coastal Plain. In fact however, it is not particularly common on the Coastal Plain due to the frequency of disturbance there. The upland hardwood forest is dominated by various species of oak Quercus.

The xeric or dry phase of this community type occurs primarily on the dry, sand ridges of the Coastal Plain. It is dominated by scrubby oaks which persist after the timbering or death of various pines, especially shortleaf pine Pinus echinata, scrub pine Pinus virginiana, and pitch pine Pinus rigida. On the more mesic sites, southern red oak Quercus falcata often dominates. Blackjack oak Quercus marylandica, post oak Quercus stellata and scrub oak Quercus ilicifolia are the characteristic species however, pine is usually always present due to the frequency of fire and/or other disturbances.

The intermediate phase of the upland hardwood forest is the most common representative of this community type. In the northern section of the Coastal Plain, the dominant species include black oak Quercus velutina, chestnut oak Quercus prinus, white oak Quercus alba and scarlet oak Quercus coccinea with blackgum Nyssa sylvatica, post oak Quercus stellata and several hickories Carya spp. also being common.

The rich or mesic phase occurs only on the best sites, such as moist ravines. The most indicative species of this community is the beech Fagus grandifolia. Quarterman and Keever (1962) termed this community (in southern Coastal Plain) the Southern Mixed Hardwood Forest. They identify 14 species which are very important and 10 taxa which are highly restricted to this community. The 14 species include beech Fagus grandifolia, white oak Quercus alba, sweetgum Liquidambar styraciflua, laurel oak Quercus laurifolia, southern magnolia Magnolia grandiflora, water oak Quercus nigra, mockernut hickory Carya tomentosa, pignut hickory Carya glabra, loblolly pine Pinus taeda, southern red oak Quercus falcata, blackgum Nyssa sylvatica, holly Ilex opaca, dogwood Cornus florida, and farkleberry Vaccinium arboreum.

Typical animals include:

Dusky salamander Desmognathus fuscus
 Red backed salamander Plethodon cinereus
 Slimy salamander Plethodon cinereus
 Two lined salamander Eurycea bislineata
 Fowler's toad Bufo woodhousei forleri
 Box turtle Terrapene carolina
 Ground skink Lygosoma laterale
 Broad headed skink Eumeces laticeps
 Eastern garter snake Thamnophis sirtalis
 Black racer Coluber constrictor
 Black rat snake Elaphe obsoleta
 Copperhead Agkistrodon contortrix
 Red shouldered hawk Buteo lineatus
 Red tailed hawk Buteo jamaicensis
 Broad winged hawk Buteo platypterus
 Bobwhite quail Colinus virginianus
 Turkey Meleagris gallopavo
 Screech owl Otus asio
 Great horned owl Bubo virginianus
 Ruby throated hummingbird Archilochus colubris
 Yellow shafted flicker Colaptes auratus
 Pileated woodpecker Hylatomus pileatus
 Red headed woodpecker Melanerpes erythrocephalus
 Hairy woodpecker Dendrocopus villosus
 Downy woodpecker Dendrocopus pubescens
 Acadian flycatcher Empidonax virescens
 Eastern wood pewee Contopus virens
 Crested flycatcher Myiarchus crinitus
 Common crow Corvus brachyrhynchos
 Blue jay Cyanocitta cristata
 Tufted titmouse Parus bicolor
 Carolina chickadee Parus carolinensis

White breasted nuthatch Sitta carolinensis
 Carolina wren Thryothorus ludovicianus
 Wood thrush Hylocichla mustelina
 Yellow throated vireo Vireo flavifrons
 Red eyed vireo Vireo olivaceus
 Black and white warbler Mniotilta varia
 Oven bird Seiurus aurocapillus
 Hooded warbler Wilsonia citrina
 Summer tanager Piranga rubra
 Cardinal Richmondia cardinalis
 Slate colored junco Junco hyemalis
 Opossum Didelphis marsupialis
 Masked shrew Sorex cinereus
 Short tailed shrew Blarina brevicauda
 Eastern cottontail Sylvilagus floridanus
 Eastern chipmunk Tamias striatus
 Gray squirrel Sciurus carolinensis
 Fox squirrel Sciurus niger
 Flying squirrel Glaucomys volans
 White footed mouse Peromyscus leucopus
 Pine vole Pitymys pinetorum
 Gray fox Urocyon cinereoargenteus
 Raccoon Procyon lotor
 Long tailed weasel Mustela frenata
 Striped skunk Mephitis mephitis
 White tailed deer Odocoileus virginianus

Critical environmental factors controlling the character of this community include water holding capacity of the soil, frequency of disturbance, and topography.

Old Field Community

This is a community type which occurs over the entire Atlantic Coastal Plain in almost all upland situations. The old field community develops on abandoned lands, particularly agricultural lands.

The vegetational composition of these old fields is largely dependent on the amount of time since abandonment. Immediately following abandonment weeds invade the land including crabgrass Digitaria sanguinalis and horseweed Erigeron canadensis. The first year after abandonment, old fields are totally dominated by horseweed. The next few years the old field community is dominated by white aster Aster pilosus. During this time, broomsedge Andropogon virginicus appears and begins to spread until it eventually dominates the old field community. During the broomsedge stage, young pines begin to appear in the fields and eventually as they grow their crowns meet and a closed canopy develops. Once this occurs the broomsedge will become

uncommon as it cannot survive under the dense shade produced by the closed canopy. As the pines grow the community type changes to a pine flatwoods or upland pine forest community and if there is little or no further disturbance upland hardwood forest becomes the climax vegetation. This sequence of changes is occurring throughout the Atlantic Coastal Plain and is called secondary succession or old field succession.

Typical animals of the early stages include:

Fowler's toad Bufo woodhousei fowleri
 American toad Bufo americanus
 Six lined racerunner Cnemidophorus sexlineatus
 Black racer Coluber constrictor
 Black rat snake Elaphe obsoleta
 Red shouldered hawk Buteo lineatus
 Red tailed hawk Buteo jamaicensis
 Marsh hawk Circus cyaneus
 Bobwhite quail Colinus virginianus
 Mourning dove Zenaidura macroura
 White eyed vireo Vireo griseus
 Prairie warbler Dendroica discolor
 Yellowthroat Geothlypis trichas
 Yellow breasted chat Icteria virens
 Meadowlark Sturnella magna
 Cardinal Richmondia cardinalis
 Towhee Pipilo erythrophthalmus
 Savanna sparrow Passerculus sandwichensis
 Grasshopper sparrow Ammodramus savannarum
 Bachman's sparrow Aimophila aestivalis bachmanii
 Field sparrow Spizella pusilla
 Opossum Didelphis marsupialis
 Short tailed shrew Blarina brevicauda
 Least shrew Cryptotis parva
 Common mole Scalopus aquaticus
 Eastern cottontail Sylvilagus floridanus
 White footed mouse Peromyscus leucopus
 Meadow jumping mouse Zapus hudsonius
 Housemouse Mus musculus
 Meadow vole Microtus pennsylvanicus
 Long tailed weasel Mustela frenata
 Striped skunk Mephitis mephitis
 Red fox Vulpes vulpes

Critical environmental factors determining its vegetational composition include length of time left abandoned, low soil water holding capacity, low soil nutrient status and frequency of disturbance. It has been shown that allelopathy or "Chemical warfare between plants" occurs in the early stages of succession (Keever, 1950) and thus this is a critical environmental factor.

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APPENDIX C

RARE, ENDANGERED AND THREATENED VERTEBRATE SPECIES
OF THE CHESAPEAKE BAY REGION

by

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April, 1973

RARE, ENDANGERED, AND THREATENED VERTEBRATE SPECIES IN THE CHESAPEAKE BAY REGION

INTRODUCTION

This report is part of a larger series of reports dealing with the Atlantic Coastal Plain and the Maine Coast as part of a coordinated effort to identify and analyze conservation priorities and selection of natural areas and landmarks along the east coast of the United States.

The Chesapeake Bay region, being one of the most outstanding because of its natural resource values and its proximity to large metropolitan complexes, was given special attention. This project was originated by The Nature Conservancy, in conjunction with the Chesapeake Bay Foundation, and was carried out by the Smithsonian Center for Natural Areas.

This report deals with rare, endangered, and threatened vertebrate animals occurring in the Chesapeake Bay area. Geographically the area is delineated by U. S. Highway 13 on the east, the North Carolina/Virginia state line to the south, the Fall Line or Interstate 95 on the west and north. This includes the Bay and its tributaries roughly to the limit of tidal influence.

A series of base maps has been developed by the Smithsonian Center for Natural Areas showing significant ecological data along the Atlantic Coastal Plain. A special set of maps of the Chesapeake Bay region indicates detailed zoological factors and sites where rare, endangered, or threatened fish and wildlife occur. Areas harboring such species have been given high rating among the conservation priorities in selecting natural areas for preservation.

SCOPE OF REPORT

The report summarizes existing and current information on rare, endangered, and threatened species of fish, amphibians, reptiles, birds, and mammals which occur in the Chesapeake Bay region. Included are species which are recognized on the U. S. Department of Interior's federal registry of endangered animals; and also species which are apparently experiencing rapid depletion in numbers and may be threatened. The data presented cover the status, estimated numbers, present distribution, reasons for decline, ecological values, and conservation measures taken or proposed for those species listed below. This information is presented in the same format as the U. S. Department of Interior's Redbook, "Threatened Wildlife of the United States", and the International Union for Conservation of Nature and Natural Resources (I.U.C.N.), Red Data Books.

METHODOLOGY

Data were assembled by contacting competent persons known to be experts on particular species or groups of species. Contact was made by personal interview, by telephone, and by a three-page questionnaire asking for detailed information on rare, endangered, or threatened species. This material was then compiled on the following data sheets.

The significant literature was reviewed, with emphasis placed on more recent papers and books (from 1960 to 1973). Since a time lag often exists between gathering of data and its publication, the most-up-to-date information was obtained through personal communication.

CLASSIFICATION OF SPECIES

There are not many rare, endangered, or threatened species of vertebrate animals in the Chesapeake Bay region. Those that occur there are dependent in part on the presence of natural and undisturbed habitats, and also on the broader aspect of uncontaminated environmental conditions. This is particularly important to birds of prey which are dependent on a long food chain, and where they may accumulate high levels of persistent chemicals. Chesapeake Bay is especially important as a nesting area for the endangered southern subspecies of the bald eagles and for ospreys. Both species reach relatively high concentrations in this area.

CLASSIFICATION OF RARE, ENDANGERED, AND THREATENED FISH AND WILDLIFE
SPECIES IN CHESAPEAKE BAY REGION

| <u>Species Name</u> | <u>Rarity Classification</u> | |
|-------------------------|------------------------------|---|
| | <u>USDI</u> | <u>IUCN</u> |
| Delmarva Fox Squirrel | Endangered | 1(b)R |
| Southern Bald Eagle | Endangered | 2(b)P* |
| Osprey | | Threatened (Amer.Birds,1973) |
| Arctic Peregrine Falcon | Endangered | |
| Ipswich Sparrow | Rare | 2(a)P* |
| Bog Turtle | Rare | 2(a) |
| Sea Turtles: | | |
| Green | Threatened | 3(a)PT |
| Loggerhead | | 3(a)PT |
| Leatherback | | |
| Hawksbill | | 1(a)PT |
| Atlantic Ridley | | |
| Maryland Darter | Endangered | 2(a)S Endangered (Miller, 1972) |

Key to Classification on IUCN List:

- (a) = full species
- (b) = subspecies
- * = denotes species or subspecies critically endangered
- 1 = endangered
- 2 = rare
- 3 = depleted
- T = subject to substantial export trade
- P = legally protected, at least in some parts of its range
- S = secrecy still desirable

Reference to List:

American Birds, 1973 (in press). The Blue List for 1973: (an early warning system for birds).

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U.S.D.I. 1973. Threatened Wildlife of the United States. Office of Endangered Species and International Activities, Bureau Sport Fisheries and Wildlife.

DELMARVA FOX SQUIRREL Sciurus niger cinereus (Linnaeus)
or

Bryants Fox Squirrel Sciurus niger bryanti
 Sciurus niger neglectus (Gray)*

Order: RODENTIA

Family: SCIURIDAE

Estimated Numbers: About 500+ are known, and may be 1000+, but no total estimates are available. In 1964, Linduska estimated the population in the low thousands.

Present Distribution: These squirrels are found only in four Maryland counties, with certainty, plus one isolated record on the county line of Caroline/Talbot County. Introductions were made in one area at Chincoteague National Wildlife Refuge, Virginia. The main range is 50 to 75 miles x 25 miles. These are plotted in the map of zoological factors of ecological importance (Map 2).

Kent County - Eastern Neck Island and Eastern Neck National Wildlife Refuge, found in grain fields and woodlands and marsh on refuge, especially along Hickory Ridge. There is an estimate of 250+ squirrels (Refuge Manager, 1972). Possibly a few still occur on land owned by Eugene DuPont near Rock Hall, but no recent records.

Queen Anne County - On Wye Island about 75 acres of loblolly pine near Wye River with an estimate of several squirrels. Possibly also at Wye Mills; possibly also near Church Hill.

Talbot County - near Trappe along Choptank River (Walsh, 1973; Flyger, 1973); at head of Miles River (duPont McConnell, 1973); possibly around Bruceville, Windy Hill and Barber areas - the latter being along the LaTrappe River and creek with no name north of Choptank River (Walsh, 1973). Possibly at Little Neck and Island Creek Neck area (Walsh, 1973).

Dorchester County - Drawbridge area (Flyger, 1973); Walsh, 1973; also suggested from Presque Isle, Vienna, Ellicott and Steele Neck (Walsh, 1973) Linkwood State Wildlife Management Area has an area of 300 acres but few squirrels were estimated (Germany, 1972).

Blackwater National Wildlife Refuge - There are 11,300 acres with about 400 to 500 acres wooded and suitable for squirrel habitat with an estimate of 150+ squirrels (Julien and Germany, 1972).

The squirrels are usually found in ratio of one to three with Gray Squirrels (the latter predominating.) In one census 142 nests were counted, but this is a poor indicator since one squirrel or pair of squirrels may make more than one nest. On a 52 acre sample plot on the Refuge, 15 Delmarva Fox Squirrels were trapped and released (8 females, 7 males). An estimated 18 squirrels for the plot was calculated. Population density based on trap-recapture census study at Blackwater N.W.R. indicates that .37 Fox Squirrels occur per acre; or one squirrel needs about four acres of habitat, depending on mast crops. (Germany and Julien, 1972). It is also suggested that squirrels occur outside the Refuge in Kentuck and Greenbriar Swamps.

L'Compte State Wildlife Refuge contains 500 acres but few squirrels. Although this is supposedly a Fox Squirrel sanctuary, the area is not being managed for their benefit.

Piney Swamp, north of Blackwater River, has also been suggested as a squirrel habitat.

Caroline County - Only one record, but as mentioned above only a few squirrels were estimated.

Somerset County - It was suggested that Big Swamp next to an existing wildlife management plot may have some squirrels (Rivinus, 1972) but no proof exists.

Chincoteague National Wildlife Refuge: Delmarva Fox Squirrels are not known to exist here in the past, although they might have been within the overall range. Squirrels were introduced in March, 1968, 14 squirrels (7 females, 7 males), but several died. Another introduction made in January, 1971, of 23 squirrels, but 5 died. There are 600 acres of marginal to fair habitat between Sow Ponds, along ridge of White Hills, to Tom's Cove. This is a total area of 2.6 x .5 miles. A young squirrel was seen in January 1972 and in the fall of 1972, (Appel, 1972), (Julien and Germany, 1972). It is estimated that 4 to 5 years may be necessary to build up a viable population; however, squirrels are not doing well and may die out completely.

Note: Good stands of mature to old loblolly pine and also pine mixed with hardwoods are preferred by squirrels. Some large timber exists in private estates on the peninsulas west of Rt. 33 near St. Michaels and Royal Oak. Inquiry did not disclose whether squirrels have ever been seen here.

Status: Classified as endangered by U. S. Department of Interior. Considered to be threatened with extinction (Flyger, 1973). May be thought of as a threatened "island form" because of restricted range on Delmarva Peninsula. The populations are decreasing fairly rapidly.

Reasons for Decline:

1. Encroachment on habitat by real estate (vacation homes, etc.) and agriculture.
2. Heavy cutting of pine and hardwood stands during 1880's and again at present. State forestry policy encourages woodlot owners to cut their mature hardwood stands and plant quick-growing loblolly pine for marketing.
3. Fires destroy habitat.
4. Indiscriminate hunting and poaching, and occasional confusion by hunters between Delmarva Fox Squirrel and Eastern Grey Squirrel Sciurus carolinensis, because they have no knowledge of different characteristics. Also, juvenile Fox Squirrels may be mistaken for Grey Squirrels.

One pair of captive squirrels is being held at Remington Farms, Chestertown, Md., for breeding purposes. Squirrels have been held for 4 years and have not yet produced young. (Galbraith, 1973).

Protective Measures Taken:

1. Establishment of Blackwater and Eastern Neck National Wildlife Refuges; plus the L'Compote State Wildlife Management Area (1970) where squirrels find sanctuary and their habitat is protected.
2. State of Maryland banned hunting Delmarva Fox Squirrels in 1971 and imposed a \$50 fine for taking them.
3. Introduction to Chincoteague N.W.R. in 1968 and 1971 to provide a breeding nucleus on federally protected lands.
4. Research is being conducted at the University of Maryland by Dr. V. Flyger and Mr. G. Taylor.

Protective Measures Proposed:

1. Stop logging mature stands of loblolly Pinus taeda and hardwoods where good squirrel habitat exists. Another incentive might be offered for leaving land in woodland condition.

2. Acquire untouched areas of Kentuck and Greenbriar Swamps adjoining the Blackwater National Wildlife Refuge which contain good squirrel habitat and possibly squirrels. Also try to investigate and acquire habitat on LaTrappe Creek and Big Swamp. An attempt should be made to acquire, (if not too late) the Wye Mills or Wye Island land since this is proposed to be developed into five-acre housing lots.

3. L'Compte State Wildlife Management Area should be managed specifically for squirrels, not for other species of game.

4. Develop further research efforts into distribution, behavior, limiting factors, and optimum habitat conditions for the species.

5. Breed in captivity if possible so as to have extra stock; release into wild to restock good habitat.

6. Public education to help people differentiate between Grey and Fox Squirrels so that they will not hunt the wrong species, nor molest them in other ways.

Ecological Significance:

1. A beautiful and unique mammal.

2. Sport hunting, wildlife photography, nature viewing.

3. Serves as prey species for several forms of predators (owls, hawks, foxes, eagles, etc.)

4. Squirrels plant seeds of mast trees and help forest reproduction.

5. The enzyme defect in the heme biosynthetic pathway is the same in the Fox Squirrel Sciurus niger as in porphyric cattle and human beings. Therefore, members of this species can provide a small animal laboratory model for studies of congenital erythropoietic porphyria (a hereditary disease of humans and cattle) associated with a similar partial deficiency of uroporphyrinogen III cosynthetase (Levin and Flyger, 1971).

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Mr. Galbraith, Asst. Mgr., Remington Farms, Chestertown, Md.

Mr. Bob Germany, Asst. Mgr., Blackwater National Wildlife Refuge, Cambridge, Md.

Mr. W. Julien, Refuge Mgr., Blackwater National Wildlife Refuge, Cambridge, Md.

Mrs. Jean duPont McConnell, (estate owner near St. Michaels), %120 120 Delaware Trust Bldg., Wilmington, Del., 19801.

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SOUTHERN BALD EAGLE Haliaeetus leucocephalus leucocephalus

Order: FALCONIFORMES

Family: ACCIPITRIDAE

Estimated Numbers: The Chesapeake Bay region has had a population of about 65 pairs of eagles since the mid-1960's, following a 60 percent reduction in nesting pairs. (Abbott, 1971).

1972 - 40 breeding pairs (Natl. Audubon Soc., pers. comm. 1972).

1972 - 58 active nests; 20 young hatched; 1.3 young/successful nest; 32% hatching success of rechecked nests (Abbott, 1972).

1971 - 56 active nests; 26 young hatched; 1.2 young/successful nest; 35.7% hatching success of rechecked nests (Abbott, 1971).

1970 - 58 active nests; 22 young hatched; 1.3 young/successful nest; 32.6% hatching success of rechecked nests (Abbott, 1970).

1969 - 50 active nests; 29 young hatched; 1.5 young/successful nest; 38.8% hatching success of rechecked nests (Abbott, 1969).

1966 - 70 pairs (Natl. Audubon Soc., 1966).

1936 - 200 pairs of eagles; 250 active nests (Abbott, 1965); 1.8 young/successful nest (Sprunt, 1973).

Present Distribution:

See map 2, and reports at Smithsonian Institution with detailed locations of eagle nests (active and inactive) for Chesapeake Bay region (1970-1973), provided by Jackson Abbott. A total of 89 nest sites (not all active in one year): 4 in Delaware, 45 in Maryland; and 41 in Virginia. The region is the most productive area for Southern Bald Eagles north of Florida.

Mason's Neck National Wildlife Refuge - contains 904 acres of federal land with 4000 acres collectively protected by State and other lands on Mason Neck. The area has a year-round concentration of eagles, both winter and summer roosters, and a few nesters. Some artificial nest platforms have been installed for eagle use. There are usually 12 to 20 adult birds in the area. Recently up to 4 pairs nested; now only one pair, (Julien, 1972). No nests are on the N. W. Refuge, but one site close by on State land.

Assateague Island National Seashore - occasional sightings only (Norris, 1973).

Chincoteague National Wildlife Refuge - one or two seen each year; used to be fairly common as a wintering bird. None nesting now, (Appel, 1972).

Chincoteague National Wildlife Refuge - one or two seen each year; but they used to be fairly common as a wintering bird. None are nesting now. (Appel, 1972).

Blackwater N.W.R. - Has densest population of breeding eagles in Chesapeake Bay area. In 1972, 3 nests on Refuge lands; 1971, 7 nests on Refuge and adjacent lands, (Julien, 1972).

Status: Endangered - on U. S. Dept. of Interior federal list of endangered species. Seriously threatened and declining. A long-term trend downwards in numbers. A shift in location of nesting activities has accompanied the decline in numbers. Eagles have disappeared from upper parts of the tributaries and rivers and the upper part of the Bay. They now concentrate near river estuaries and in the lower part of the Bay. Pollutants here seem to be more diluted and dispersed due to the action of currents; therefore, the food supply is better, (Abbott, 1965, 1971).

Reasons for Decline:

1. Trauma, primarily from shooting, is one of the greatest, if not the greatest, cause of mortality among eagles, (Coon, et.al., 1970).

2. Concentrations of pesticides and their metabolites which are probably major factors causing decrease in Bald Eagle populations through egg-shell thinning from non-lethal amounts of DDE and other metabolites, or by direct mortality by lethal amounts, (see literature references on contamination).

3. Pollution of waterways (feeding areas) which limits fish (food supply) of eagles.

4. Removal of habitat and nest sites around the bay by farming, real estate development, encroachment of power transmission lines, and lumbering of tidewater forests.

5. Reproductive rate is below that considered necessary to maintain the population. A 50% fledgling rate is needed, or at least one fledged young per nest, for stable populations. In the Chesapeake Bay area, however, the fledgling rate is only 5 to 35% (Abbott, 1971). According to Sprunt (1969) and Sprunt et al. (1966), nesting success is only 15% here.

Protective Measures Taken:

1. Protection by federal law and fine of \$500 for killing an eagle. Laws to prohibit shooting.

2. Removal of bounty for eagles (which Alaska had for years).

3. Intensive investigations into pesticide and other chemical contamination of eagles and eagle eggs, their biology, distribution, behavior, etc. being carried out by Patuxent Wildlife Research Center, National Audubon Soc., State fish and game departments, etc. Investigations into artificial breeding programs.

4. Censuses are being made annually by Jackson Abbott, Fred Scott, Bureau of Sport Fisheries and Wildlife, and others to locate nest sites around Chesapeake Bay and determine activity, productivity, etc. Usually two airplane flights are made per breeding season.

5. Continued protection and acquisition of nest sites where not owned by federal or state conservation agencies to avoid destruction or disturbance to nesting eagles. In some cases, as in Maine and Florida, individual agreements are reached with private landowners to protect nest sites and birds.

6. Continued protection on federal and state refuges.

Protective Measures Proposed:

1. Acquisition of all known nest sites around Chesapeake Bay area as sanctuaries.

2. Continued research on, and control of, environmental contaminants, especially pesticides and PCB's which can effect eagle reproduction.

3. Increased public education and involvement in saving the species.

4. Continued research on eagle behavior and reproduction, plus emphasis on captive breeding programs.

5. Increased enforcement of eagle laws and increased punishment of offenders.

6. Water pollution abatement.

7. Proper safe-guards on power lines to prevent electrocution, where needed.

Ecological Significance and General Value:

1. U. S. National symbol - with all accompanying traditional, cultural, aesthetic, historical, symbolic and inspirational qualities with which this bird is imbued.

2. Important indicator species to monitor effects of pesticides and other environmental contaminants.

3. Predation and maintenance of healthy prey populations.

4. Bird-watching as a popular past-time, plus wildlife photography.

5. Political expediency to "save" the species.

6. Excellent educational tool to teach conservation attitudes to children.

References: (personal communication)

Mr. Jackson Abbott, 8501 Doter Drive, Alexandria, Va. 22308.

Mr. J. Appel, Refuge Manager, Chincoteague National Wildlife Refuge, Box 62, Chincoteague, Va. 23336.

Mr. W. Julien, Refuge Manager, Blackwater National Wildlife Refuge, Cambridge, Maryland.

National Audubon Society, Research Division, 115 Indian Mound Trail, Tavernier, Fla. 33070.

Mr. Thomas Norris, Jr., Superintendent, Assateague Island National Seashore, Rt. 2, Box 294, Berlin, Md. 21811.

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OSPREY *Pandion haliaetus*

Order: FALCONIFORMES

Family: PANDIONIDAE

Estimated Numbers:

Virginia = 500 plus pairs; in 1972, 390 nests, 130 known productive nests, 262 known young produced, 209 known fledglings (Byrd, 1973).

Delaware = 25 to 30 pairs

Maryland = 750 pairs \pm

Chesapeake Bay has largest known population in North America

Present Distribution:

Virginia - See map 2 of locations of nest sites provided by Dr. M. Byrd, Dept. of Biology, College of William and Mary, Williamsburg, Va. Also see Table I, Proceedings of the first North American Osprey research conference (Byrd, 1973).

Delaware - Information available at Delaware Dept. Natural Resources and Environmental Control (Lesser, 1973); however, many of the sites are outside Chesapeake Bay drainage.

Maryland - See map 2, with nest site locations provided by Mr. Stan Wiemeyer, Research Biologist, Patuxent Wildlife Research Center, Laurel, Md.; and by Mr. Jan Reese, researcher, St. Michaels, Md.

Selected Areas with Active Nests:

| | <u>1970</u> | <u>1971</u> |
|------------------------|-------------|-------------|
| Virginia - James River | 3 | 6 |
| Chickahominy River | - | 12 |
| York River | 11 | 28 |
| Mobjack Bay | 15 | 17 |
| New Pt. Comfort | 50 | 45 |
| Rappahannock River | 57 | 77 |
| Fleets Bay | 17 | 29 |

| | <u>1970</u> | <u>1971</u> |
|--------------------|-------------|-------------|
| Eastern Shore | | |
| Atlantic Side | 41 | 46 |
| Eastern Shore | | |
| Ches. Bay Side | - | 49 |
| Total Active Nests | <u>194</u> | <u>309</u> |

Maryland/Virginia - Lower Potomac River east of Rt. 301
(Wiemeyer, 1972)

Maryland Shore - 100 pairs
Virginia Shore - 40 pairs
Pt. Lookout at
mouth of Potomac
River - 20+ pairs
Smith Pt. at
mouth - 20-30 pairs

Maryland - lower part of Patuxent River - 10+ pairs
(Wiemeyer, 1972)
from Cove Pt. at mouth of Patuxent To Fair Haven,
south of Annapolis - 1 to 2 pairs (Wiemeyer, 1972)

from Chester River to Martin Wildlife Refuge along
Eastern Shore of Md. to Va. border of Delmarva
Peninsula - 500 to 600 pairs (Reese, 1973)

Poplar Island - 30 to 35 pairs
Broad Creek - 50 pairs
Martin N.W.R. - 20 to 30 pairs
Choptank River - 24 pairs
South Marsh Island and Bloodworth Island -
100 pairs

Chincoteague Natl. Wildlife Refuge - 10 to 20 pairs
(Appel, 1972); maximum of 8 pairs (Byrd, 1973).

Assateague National Seashore - rare sightings, uncommon
(Norris, 1973).

Delaware - Atlantic shore, mostly out of Chesapeake Bay drainage,
from Oak Orchard to Bombay Hook National Wildlife
Range - 20 to 30 pairs (Norris, 1973)

Oak Orchard and
Little Bay area - 2 to 3 pairs

| | |
|--------------------------|--------------|
| Little Assawoman Bay | - 5 pairs |
| Rehoboth Bay (1 colony) | |
| | 13 pairs |
| (nesting on duck blinds) | |
| Cape Henlopen up to | |
| Reedy Island | 6 to 8 pairs |
| Bombay Hook Natl. | |
| Wildlife Refuge | 1 pair |
| Nanticoke Refuge | 1 pair |
| Blackbird Creek | 1 pair |

Status:

Not officially classified as rare or endangered; however, is declining in specific regions and may be seriously threatened.

Reasons for Decline:*

1. It has been estimated that the annual production of ospreys must be between 0.95 to 1.30 young fledged/breeding female to maintain a stable population (Henry and Wight, 1969). (However, this may be underestimated by 5 to 10% if nests with no eggs are excluded from original figures (Henny and VanVelzen) and only the productive nests used, rather than active nests.) Byrd (1973) estimates an annual production of 1.22 young/productive nest is needed in Virginia. Reese (1965) calculated a minimum annual rate of decline of 2 to 3% in Maryland. In many areas of the Chesapeake Bay, annual production is now below these averages, as per following reports:

Maryland shore, Charles County, of Potomac River - 0.70
young fledged/active nest (Wiemeyer, 1971)
Virginia shore, as above, Westmoreland Co. - 0.70 (Wiemeyer, 1972).
Talbot County, Eastern shore, Maryland - -.96 to 1.16 (1965 -
1966) (Reese, 1970);
Talbot County, Eastern Shore, Maryland - 1.03 (1964-65) (Reese,
1965).
Virginia shore from Norfolk to Potomac River - 0.69 (1971)
0.60 (1972) (Byrd, 1973).
Martin National Wildlife Refuge, Md. - 1.4 young/active nest,
1.8 young/productive nest (Rhodes, 1972).
Choptank River, Eastern Shore, Md. - 0.93 to 0.96 (Reese, 1972).

2. The use of pesticides and other environmental contaminants is causing contamination in ospreys from accumulation of chlorinated hydrocarbons through the food chains, which in turn are responsible for egg failure in active nests. Reproductive decline in ospreys has been reported from many sections of the United States (Ames, 1966), Hickey,

(1969), etc. In Maryland, Hickey and Anderson (1968) reported 2.0 to 2.8% decrease in egg shell weights. This is resulting in egg breakage and embryonic death.

3. Losses to osprey eggs and young by predators such as raccoons and rats.

4. Destruction of nests and nestlings by high tides, waves and winds.

5. Destruction of nests by U. S. Coast Guard personnel when they are found on top of lighted navigational markers. For example, 43 nests were removed in Talbot Co., between 1963-1969, (Reese, 1970) and maybe as high as 15 nests/year in the central Chesapeake Bay region (Reese, 1965).

6. Increased use of boats and disturbances around osprey nest sites.

Protective Measures Taken or Proposed:

1. Artificial nesting platforms have been erected and maintained annually to enhance osprey nesting success. Reese (1970) erected 133 platforms between 1964 and 1969 in Talbot Co.; and a total of 72 nests platforms have been erected in Martin National Wildlife Refuge. These have shown a high degree of occupancy; for example, a total of 59 nests were active on the 72 structures between 1968 and 1971 (Rhodes, 1972). Production tripled since artificial nest structures were started in 1968, up to 1971.

2. Coast Guard directive against removing osprey nests from navigational aids was issued by Admiral Bullock. It covers Coast Guard personnel and activities in Maryland, Virginia, North Carolina and part of New Jersey. Nests may not be touched during breeding season but may be removed afterwards if interfering with navigational aids.

3. Dr. Byrd and students are putting up signs around marinas and fishing sites asking boaters and fishermen not to tie up next to osprey nests because this may drive off parents and cause death of eggs or young.

4. Continued research on effects of pesticides on osprey reproduction such as presently being carried out at Patuxent Wildlife Research Center, and other research centers.

5. Continued continental censusing and evaluation of populations, plus continued surveillance of Chesapeake Bay populations.

6. Discontinued use of pesticides and other chemicals so as to increase chances of reproductive success; also abatement of water pollution so as to increase fish (food) supply.

Ecological Significance and General Importance:

1. Aesthetic value as a bird of prey and beautiful species.
2. Important indicator species to monitor effects of pesticides, especially in Chesapeake Bay which is near large metropolitan centers.
3. Predation and maintenance of health in prey populations.
4. Bird-watching as a popular recreation.

References: (personal communication)

Mr. J. Appel, Refuge Manager, Chincoteague National Wildlife Refuge, Chincoteague, Maryland.

Dr. M. Byrd, Dept. Biology, College of William and Mary, Williamsburg, Virginia.

Charles Lesser, Mgr. Technical Services, Division Fish and Wildlife, Dept. Natural Resources and Environmental Control, Edward Tathall Bldg., Legislative Add. and D Street, Dover, Delaware, 19901.

T. F. Norris, Supt. Assateague National Seashore, Rt. 2, Box 294, Berlin, Md.

Jan Reese, Researcher, St. Michaels, Md., 21663; also c/o Medical College, Johns Hopkins University, Baltimore, Maryland.

Stanley Wiemeyer, Research Biologist. Patuxent Wildlife Research Center, Laurel, Maryland.

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ARCTIC PEREGRINE FALCON Falco peregrinus tundrius

Order: FALCONIFORMES

Family: PANDIONIDAE

Estimated Numbers: known as fall (and spring to a lesser degree) migrants only, passing Atlantic oceanside. No known breeding birds now reported anywhere in eastern United States (Cade, 1973); up to 2000 individuals (Mattox, 1973); about 1000 first year migrants (Ruos, 1972), 500+ individuals (Ward, 1973).

Present Distribution: Usually sighted at Assateague Island in Maryland and Virginia (36 mi. x 1+ mi.) along the Atlantic Coastal migration route. Largest concentrations found within two-mile swath of ocean. This is probably the largest and most significant resting and feeding site for Arctic Peregrines anywhere in continental United States (Ward, 1973). (Lies outside Chesapeake Bay area).

The major area at Assateague Island is on the north edge of Fox Hill Levels. Other sites given in table below.

PEREGRINE SIGHTINGS ON ASSATEAGUE ISLAND
(taken from Table 4, Ward & Berry, 1972)

| | <u>1970 Observation Time</u> | | <u>1971 Observation Time</u> | |
|-------------------------------|------------------------------|----|------------------------------|----|
| | in % | | in % | |
| Maryland, North of State Park | 1 | 3 | 12 | 11 |
| Md., State Park | - | NT | 2 | 1 |
| Md. beach south State Park | 18 | 52 | 53 | 54 |
| Md., Fox Hills Levels | 41 | 36 | 40 | 27 |
| Md., Little Fox Levels | - | NT | 2 | 1 |
| Virginia Sector | 8 | 9 | 11 | 6 |

Barrier beaches along islands of Delmarva Peninsula where falcons also occur include: Fisherman, Myrtle, Smith, Shipshoal, Hog, Revel, Cobb, Parramore, and Wreck Islands.

Occasional sporadic sightings are seen around Chesapeake Bay region; more often spring migrants may be seen on west side of Chesapeake Bay and Delmarva oceanside. Birds usually stay 1 to 5 days en route. 10% or less of the adults migrate along the Atlantic Coast beaches with the immatures. Usually the immatures are in a ratio of 5 or more to every one adult (Shor, 1970, b).

Status: Classified as endangered on the U. S. Dept. of Interior's official list. No appreciable recent decline in general abundance of migrants along Atlantic Coast (Ruos, 1972; Ward & Berry, 1972; 92nd Congress). In addition, the age ratios of immatures to adults in 1970-71 seemed similar to those recorded since 1938 (Ward & Berry, 1972; Ruos, 1970). Nevertheless, there is a strong implication that a substantial population decline took place after 1947 (Nye, 1969; Ward & Berry, 1972). Appel (1972) reports fewer sightings of immatures at Chincoteague National Wildlife Refuge in 1972.

Reasons for Decline:

1. Shooting of birds.
2. Destruction of nests.
3. Stealing of eggs, young, and adults, and trapping by falconers and collectors.
4. Breeding failure resulting from cumulative effects of pesticides and other environmental contaminants, affecting the reproductive and egg shell mechanisms. The problem resulting from cumulative effects of pesticides and other environmental contaminants is very well presented by Ward & Berry, 1972, p. 484-485. In addition, there is **an** occasional direct poisoning from pesticides. There is reason to believe that, based on experience with the American Peregrine Falcon, this subspecies will go into the same pattern of decline even though many migrants seem to come from Greenland where there is a low contamination by pesticides at present.
5. Periodic short-term adverse effects of weather on reproduction, for example, summer of 1972 (Ruos, 1970).

Protective Measures Taken:

1. Federal and most State laws protect the species.
2. Federal year-round protection by law in the U. S., plus most States and Provinces.
3. Research investigations into artificial propagation techniques at Cornell University's Laboratory of Ornithology, Patuxent Wildlife Research Center, and possible other research centers in Canada, plus by 20 or more falconer-aviculturists.
4. Protection by Denmark, and its colony, Greenland.
5. Surveillance and protection of known nest sites out West and in Canada and Alaska.
6. Cooperative program between the Canadian Wildlife Service and U. S. Wildlife agencies.
7. Continued monitoring of pesticides and effects on birds of prey.

Protective Measures Proposed:

1. An immediate and forceful recommendation against the proposed hardtop road which is to be built between the Chesapeake Bay bridge in Maryland to the Virginia bridge, following along Assateague Island National Seashore. This development would destroy a significant wilderness area which falcons presently utilize for feeding and resting during migration.
2. Further acquisition and protection of barrier beaches and islands along the Atlantic side of Delmarva Peninsula to provide additional safe resting sites for migrating falcons.
3. Reduced use of persistent and other environmental contaminants in the U. S. and Canada and Europe.
4. Continued research on reproductive failure reasons; and improved artificial breeding in captivity.
5. Increased legal protection and enforcement in all countries where Peregrine Falcons breed and winter.
6. Limit use by surf fishermen and motor vehicles along barrier beaches during time of migration of falcons, because resting should not be disturbed. (This added stress factor may be more deleterious than normal if birds are loaded with DDT, DDE, DDD. The birds appear to have less tolerance to disturbances when in this condition).

7. Strengthen efforts to monitor flyways and obtain accurate annual migration numbers and any changes in numbers or age ratios which might signal decline of populations.

8. Encourage competent falconers to trap immature birds and handle them with controlled diets (free of chemicals), exercise, artificial incubation of eggs to prevent breakage, etc. (Cade, 1970).

9. Refrain from planting erosion grasses on barrier beaches, and forbid camping on traditional resting sites so as not to disturb birds unnecessarily or obstruct their surveillance of surroundings.

Ecological Importance and General Importance:

1. Aesthetic appeal as a magnificent bird of prey.

2. Bird-watchers, photography, nature loving.

3. Important indicator species to use in monitoring effects of pesticides, and other environmental contaminants.

4. Predation which helps maintain a healthy population of prey species.

5. Traditional, historical and scientific use of falcons by falconers.

References: (personal communication)

Mr. J. Appel, Refuge Mgr. Chincoteague National Wildlife Refuge, Chincoteague, Virginia.

Dr. Tom Cade, Professor. Researcher. Laboratory of Ornithology, Cornell University, Ithaca, New York 14850.

Mr. J. Mattox. Asst. Deputy Director. Dept. Natural Resources, 907 Ohio Depts. Bldg., Columbus, Ohio, 43215.

Dr. Prescott Ward. DVM. Ecology Division, Edgewood Arsenal, Baltimore, Maryland.

Mr. Jim Ruos, Research biologist. Patuxent Wildlife Research Center, Laurel, Maryland.

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IPSWICH SPARROW* Passerculus princeps

Order: PASSERIFORMES

Family: FRINGILLIDAE

* Discussed more fully in reports: "Rare, Endangered, and Threatened Fish and Wildlife of the Maine Coast", and "Rare, Endangered, and Threatened Fish and Wildlife of the Atlantic Coastal Plain", by A. LaBastille.

Estimated Numbers and Present Distribution: only rare sightings are reported from Chesapeake Bay region, mainly on Assateague Island and other barrier beaches of Delmarva Peninsula during migrations. Sparrows prefer undisturbed coastal beaches with dunes, rocks and grass; therefore, might be expected to stop and rest wherever appropriate habitat still exists.

BOG TURTLE Clemmys muhlenbergi

Order: TESTUDINATA

Family: TESTUDINIDAE

Estimated Numbers: Very difficult to estimate, but probably in magnitude of 30 adults in Chesapeake Bay area of Maryland (Nemuras, 1973); Arndt (1973) estimates 500+ adults in all Chesapeake Bay region; Barton (1973) estimates 1000+ (15 + colonies).

Present Distribution:

Maryland: only recorded from 3 counties: Baltimore, Harford and Cecil and most of these locations actually occur on the Piedmont area; however, the following are probably within the Chesapeake Bay drainage (Nemuras, 1967).

- a. Near Conowingo Dam, Susquehanna River, Cecil Co. 1965-68 and 1947-1969 records.
- b. Broad Creek, Harford Co. - old record.
- c. Elk Neck, Cecil Co. - 1945 record.
- d. Grave Run Mills, Baltimore Co. - 1941 record.
- e. Eko, Baltimore Co. - 1960 record.
- f. Gunpowder Falls, Baltimore Co. - 1960 record.
- g. Sassafras River, Kent Co. - This is the southernmost point where turtles are found on Delmarva Peninsula.
- h. Bel Air, on Rt. 1 near Baltimore - possibly gone.

Delaware:

- a. Newark, New Castle Co. - 1955 record (Nemuras, 1972).
- b. Northern 3/4 of New Castle Co. (Nemuras, 1972).
- c. Odessa, New Castle Co. (Arndt, 1972)

Virginia: No colonies known on coastal plain.

Reasons for Decline:

1. Destruction of bogs.
2. Removal of large numbers of specimens from their colonies by collectors. Bog turtles bring \$100 to \$150 or more per turtle in pet stores and from individual sales.
3. Drying up or pollution of cold, clear ground water and seepage water sources above bogs can change bog habitat and drive out turtles.
4. Flooding, both natural (especially Hurricane Agnes), and man-made (by dams) destroys bogs and colonies of turtles.

Protective Measures Taken:

1. Protected by state law in New York, Pennsylvania, New Jersey and Maryland (Oct. 1972). Illegal to take, sell, transport or hold these turtles, \$1000 fine in Maryland; no enforcement or fines in New Jersey; \$10 in Pennsylvania.
2. A single swamp has been bought by a naturalist to save one colony of Bog Turtles.
3. Extreme secrecy among Bog Turtles investigators and conservationists to prevent information about locales from being made public.

Protective Measures Proposed:

1. Acquire known Bog Turtle bogs and swamps with adjacent drainage basins to save from development. Possibly introduce turtles to prime habitat in hopes of establishing new colonies.
2. Set up state Bog Turtle sanctuaries.
3. Strict fines and enforcement against purchase and sales by pet dealers and collectors.
4. Public education about value of bogs and wetlands and their unique fauna.
5. Continue censuses and life history studies to determine localities, numbers and disturbances, (may be undertaken in 1973 by James Weaver, for Smithsonian Institution).

Ecological Significance and General Values:

1. Of no specific ecological importance, but does add to diversity of wetland fauna.
2. A very old relic, boreal, species of evolutionary interest.
3. Aesthetically pleasing reptile of remarkable intelligence and adaptability to captivity.
4. Scientific and natural appeal of wetlands areas.

References: (Personal communication)

Dr. Rudolf Arndt, Senior Research Biologist, c/o Ichthyological Associates, 100 S. Cass Street, Middletown, Del. 19709.

Mr. A. J. Barton, c/o Undergraduate Program, National Science Foundation, Washington, D. C.

Mr. Ken Nemuras, Herpetologist, 5101 Gwynn Oak Ave., Baltimore, Maryland, 21207.

Mr. Jim Weaver, Herpetologist, 30 Eshelman Rd., Lancaster, Pa. 17601.

Literature:

Arndt, R. G. 1972. Additional records of Clemmys muhlenbergi in Delaware, with notes on reproduction. Bull. Md. Herp. Soc. 8(1):1-5.

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SEA TURTLES* Green Turtle - Chelonia mydas
 Loggerhead Turtle - Caretta caretta
 Leatherback Turtle - Dermochelys coriacea
 Atlantic Ridley Turtle - Lepidochelys kempii
 Hawksbill Turtle - Eretmochelys imbricata

Order: CHELONIA

Family: CHELONIDAE

* Discussed more fully in Atlantic Coastal Plain report.

Estimated Numbers and Distribution:

All are endangered or threatened. With exception of the Loggerhead Turtle. The occurrence of marine turtles is largely sporadic and undeterminable along the Atlantic Coast, especially Chesapeake Bay area. The presence of barrier beaches and islands on the Atlantic side of Delmarva Peninsula, and bays of Chesapeake Bay Region, provide possible areas where turtles can rest and feed on journeys along coast.

Green Turtle - rare but regular wanderer along coast - 20 to 30 nest per year (Pritchard, 1972), Rainey, 1972), (Brongersman, 1972). Noted in summer months in Calvert County and Worcester County, Maryland, (Cooper, et al, 1972).

Loggerhead Turtle - most important remaining nesting localities are between Florida Keys and North Carolina.

Noted at Worcester, Wicomico, Dorchester and Calvert Counties in Maryland (Cooper, et al, 1972).

Delaware Fish and Game personnel report few sightings at Delaware River Bay. May have nested historically along Delmarva barrier beaches.

Leatherback Turtles - only sporadic and rare captures on coast (Pritchard, 1972), (Rainey, 1972), (Brongersman, 1972). Four specimens known from shores of Chesapeake Bay: (3 in Calvert County, one in Dorchester County, Cooper, et al., 1972).

Atlantic Ridley Turtle - commonly captured as immatures along coast as far as Mass. (Pritchard, 1972), Rainey, 1972), (Brongersman, 1972).

4 Maryland specimens known: one from Baltimore Harbor, 2 from

Calvert County, 1 from mouth Potomac River (Cooper, et al, 1972).

Hawksbill Turtle - very sporadic to Massachusetts (Brongersman, 1972). No known specimens from Maryland, but undoubtedly occurs in estuaries of Potomac and other rivers (Cooper, et al, 1972).

Protective Measures Proposed:

1. Educate public about endangered status of sea turtles and urge their cooperation towards protecting any turtles seen while on beach or while boating, fishing or swimming.

2. Acquire and protect barrier beaches along Atlantic Coast for those turtles which might possibly nest there.

References:

Delaware Fish and Wildlife Div., Dept. of Natural Resources and Environmental Control, Edward Tathall Bldg., Dover, Del., 19901.

Dr. P. Pritchard, Department of Zoology. Univ. of Florida, Gainesville, Florida, 32601.

Mr. William Rainey. Caribbean Research Institute., College of Virgin Island, St. Thomas, U. S. Virgin Islands, 00801.

Literature:

Brongersman, L. D. 1972. European Atlantic Turtles, Zoologische Verhandelingen, #121, 2 vols., E. J. Bryll Publ; Lyden, Netherlands.

Cooper, J. E. (Chairman), et al. 1972. Endangered amphibians and reptiles of Maryland. Report of Maryland Herpetological Society, 2643 No. Charles St., Baltimore, Md. 21218.

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Hardy, J. D. 1972. Reptiles of the Chesapeake Bay region. Rept. to U. S. Army Corps of Engineers. in press.

Klimkiewicz, M. K. 1972. Reptiles of Mason Neck. Atlantic Naturalist, 27(1):20-25.

MARYLAND DARTER Etheostoma sellare

Order: PERCIFORMES

Family: PERCIDAE

Estimated Numbers: There are evidently only one or two small populations, with numbers unknown.

Present Distribution: Found only in two streams in Harford County, Md.

1. Deer Creek - This is a tributary of Susquehanna River, 1.3 miles southeast of Lanington along Stafford Road; second riffle above mouth of the Creek; 20 to 30 miles above Susquehanna.
 - a. 34 specimens taken in State Park, May, 1965, by Dr. Raney and Dr. Schwartz (Tsai, 1973).
 - b. 8 specimens taken July, 1970, and October, 1971, by Dave Thomas for private collection (Wang, 1973).
 - c. No specimens taken after careful sampling along creek 10-15 miles in length, checking over 100 holes and every few feet along course, upstream and downstream from point where specimens were caught previously (Wang, 1973).
2. Swan Creek - east Branch
 - a. 2 specimens collected in 1912 by Radcliffe and Welsh; the type specimen (see literature).
 - b. 1 specimen taken June 10, 1962, by Drs. Knapp, Richards, Miller and Foster, probably for Smithsonian Institution collection (see literature).
 - c. No specimens taken by Dr. Tsai summer of 1967 and 1968 after sampling (Tsai, 1973).

Status: Listed as endangered by USDI federal list of endangered species; also as rare or extinct (2(a)S) by IUCN list. Nevertheless, both organizations state "there are no data to support a statement that fish have declined". Species is not extinct, as of 1970-71, but is considered endangered by Wang (1973). Tsai (1973) considers species very rare.

Reasons for Decline:

1. Limited habitat. Much of its habitat was drowned out in Ice Age Melt.
2. Very small population.
3. Possible slow natural change of aquatic environment. (e.g. water chemistry, stream contours, stream bottom, ground water, etc.).
4. Evolutionary changes. Species is at the periphery of range of the subgenus.
5. Potential pollution by housing and commercial developments near streams. Presently streams are not polluted, and those nearby developments are not apparently threatening. Potential damming of creeks.
6. Extreme fluctuations in creeks could reduce population, as could siltation.
7. Conowingo Dam, downstream on Susquehanna, has not had any apparent effect on the darters in Deer and Swan Creeks.

Protective Measures Taken:

None other than to request biologists and ichthyologists not to collect or disturb fishes and habitat.

Protective Measures Proposed:

1. Acquire stream banks and bed for several miles on either side of main center of population and maintain as wooded, natural sanctuary for Maryland Darter. This would prevent dams flooding up-stream and any developments would have to be set back from creek.
2. Precautions are needed to assure proper handling of sewage, storm water run-off, and other wastes from nearby residential and commercial development to prevent seepage into creeks.
3. Begin investigations into life history of darter, including population movements, to determine possible migratory or seasonal movements in and out of creeks.
4. Prevent fish collectors from decimating existing populations.

Ecological Significance and General Value:

1. Biological and genetic values as unique evolutionary development and species.
2. No value as aquarium fish or pets.
3. Diversity of freshwater fish fauna.

References: (personal communication)

Dr. E. Raney, Director, Ichthyological Associates, Forest Drive, Ithaca, New York, 14850.

Dr. Chufa Tsai, Institute of Natural Resources, University of Maryland, College Park, Maryland.

Dr. Johnson Wang, Ichthyological Associates, Odessa, Delaware.

Literature:

Knapp, L. S., W. J. Richards, R. V. Miller and N. R. Foster. 1963. Rediscovery of the percid fish Etheostoma sellare (Radcliffe and Welsh). Copeia:455.

Radcliffe, L. and W. W. Welsh. 1914. Description of a new darter from Maryland. Bull. U. S. Bur. Fisheries, vol. 32:29-32.

ACKNOWLEDGEMENTS

Special appreciation is extended to the Office of Endangered Species of the United States Department of the Interior's Bureau of Sport Fisheries and Wildlife for its cooperation and willingness to share information contained in the files and "Redbook" of threatened fish and wildlife. In addition, gratitude is expressed to the many Government biologists at the Patuxent Wildlife Research Center and at the Bird and Mammal Laboratories in the Smithsonian Institution for providing valuable information.

A number of scientists at Universities and Cooperative Wildlife Research Units, National Park supervisors and biologists, National Wildlife Refuge Managers, and State Fish and Game Agents were contacted personally, or by telephone and letter. To each of them who responded with pertinent data, sincere thanks is given.

APPENDIX D

RARE, ENDANGERED, AND ENDEMIC PLANTS
OF THE CHESAPEAKE BAY REGION

by

Russell L. Kologiski
Fonda R. Hivick
Clyde W. Reed
Dale W. Jenkins

Center for Natural Areas
Ecology Program
Smithsonian Institution

RARE, ENDANGERED AND ENDEMIC PLANTS OF THE CHESAPEAKE BAY REGION

No list of rare, endangered or endemic plants exists for the Chesapeake Bay Region or for the States of Maryland, Virginia, or Delaware. A list was prepared by reviewing all of the botanical books and manuals of the region, contacting local and other botanists, and checking herbarium specimens in the National Museum of Natural History, the Gray Herbarium at Harvard, and the Herbarium of the New York Botanical Garden. Specimen records were verified and exact locality data were obtained.

Only native species of higher plants were included and rare introduced or adventive species were not considered. The rarity or endangered status was determined on the basis of rarity as a species, not with regard to local rarity in the region or State involved. There were 23 local or endemic species and valid varieties found in the region. Many of these species are known as endemic in only one or a few localities and no where else in the world. Several of the species are possibly extinct at present since they have not been collected for many years and have not been reported. Some of the species have wide distributions but are being rapidly depleted and may be endangered in the near future. No field studies were conducted to determine whether the species presently exist, but all recent information was utilized in determining rarity status.

The data for each species are presented together with distribution maps showing the species distribution, and the detailed distribution in the Bay Region. It is hoped that this will stimulate study of rare and endangered flora and will help in preservation.

Summary List of Rare, Endangered, and Endemic Plants of the Chesapeake Bay

| Plant Name | Map Symbol |
|---|------------|
| <u>Alnus</u> <u>maritima</u> (Marsh) Nuttall | 1 |
| <u>Aristida</u> <u>lanosa</u> var. <u>macera</u> Fern.& Grisc. | 10 |
| <u>Bacopa</u> <u>simulans</u> Fern. | 8 |
| <u>Bacopa</u> <u>stragula</u> Fern. | 9 |
| <u>Baptisia</u> <u>pinetorum</u> Larisey | 5 |
| <u>Calamovilfa</u> <u>brevipilis</u> var. <u>calvipes</u> Fern. | 24 |
| <u>Cassia</u> <u>fasciculata</u> var. <u>macroserma</u> Fern. | 11 |
| <u>Diodia</u> <u>teres</u> var. <u>hystricina</u> Fern.& Grisc. | |
| <u>Eupatorium</u> <u>saltuense</u> Fern. | 4 |
| <u>Gaylussacia</u> <u>brachycera</u> (Michx.) Gray | 2 |
| <u>Juncus</u> <u>caesariensis</u> Coville. | 23 |
| <u>Juncus</u> <u>griscomi</u> Fern. | 18 |
| <u>Justicia</u> <u>mortuifluminis</u> Fern. | |
| <u>Lechea</u> <u>maritima</u> var. <u>virginica</u> Hodgdon | 3 |
| <u>Oxypolis</u> <u>canbyi</u> (Coult.& Rose) Gern. | 12 |
| <u>Panicum</u> <u>aculeatum</u> Hitchc. & Chase | |
| <u>Panicum</u> <u>mundum</u> Fern. | 13 |
| <u>Pycnanthemum</u> <u>monotrichum</u> Fern. | 20 |
| <u>Pyxidanthera</u> <u>brevifolia</u> Wells. | 21 |
| <u>Rudbeckia</u> <u>heliopsidis</u> T. & G. | 22 |
| <u>Schwalbea</u> <u>americana</u> L. | 6 |
| <u>Scirpus</u> <u>flaccidifolius</u> (Fern.) Schuyler | 17 |
| <u>Trillium</u> <u>pusillum</u> var. <u>virginianum</u> Fern. | 14 |

BETULACEAE

Alnus maritima (Marsh) Nuttall

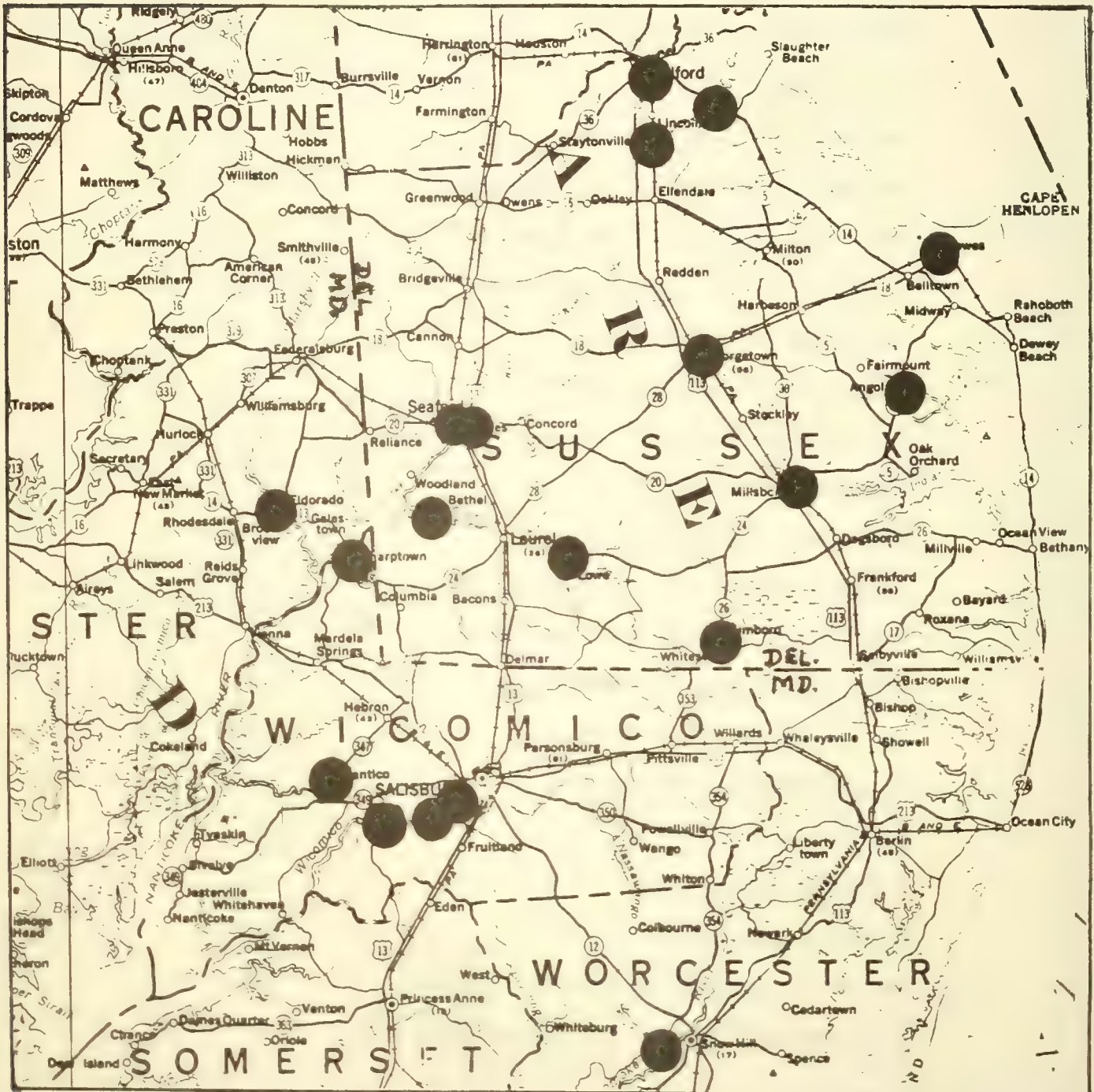
Seaside Alder

Habit: Small tree or shrub

Habitat: Pond shores and stream banks.

Range: Southern Delaware and adjacent Maryland, also several small populations in Oklahoma; Sussex County, Delaware and Wicomico, Worcester, Caroline Cos. Maryland.

Status: Endemic to the above regions, locally abundant.

Reference: Mr. Peter Mazzeo, National Arboretum
U.S. National Herbarium.

One inch = approximately eight miles



D-4

Alnus maritima (Marsh) Nuttall

MILES

0 100 200 300 400

90°

85°

80°

75°

25°

30°

35°

40°

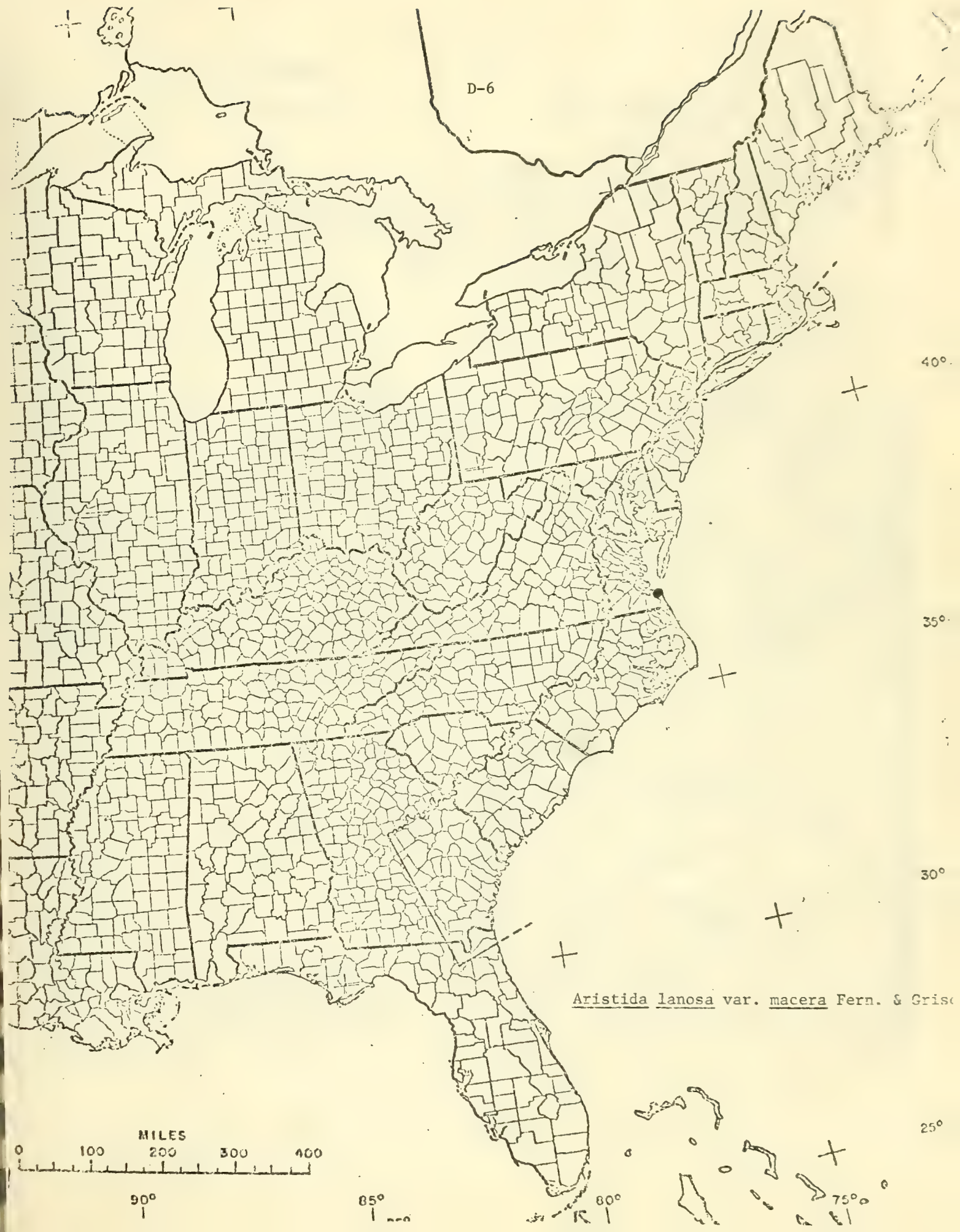
Aristida lanosa var. macera Fern. & Grisc.

Habit: Herb

Habitat: Dry woods

Range: Southeastern Virginia; Princess Anne County, Virginia

Reference: Rhodora 37:135, 1935.



SCROPHULARIACEAE

Bacopa simulans Fern.

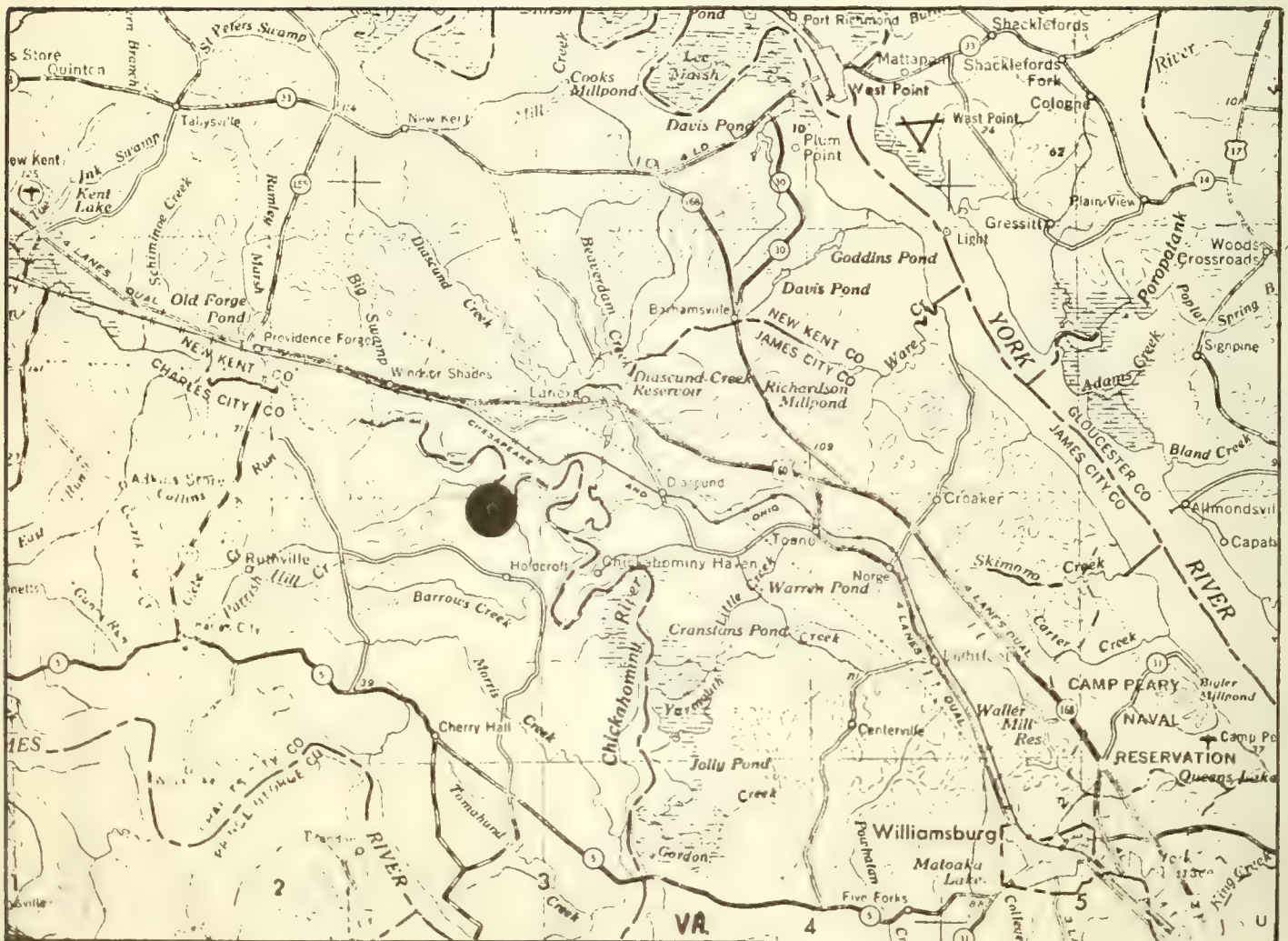
Water-hyssop

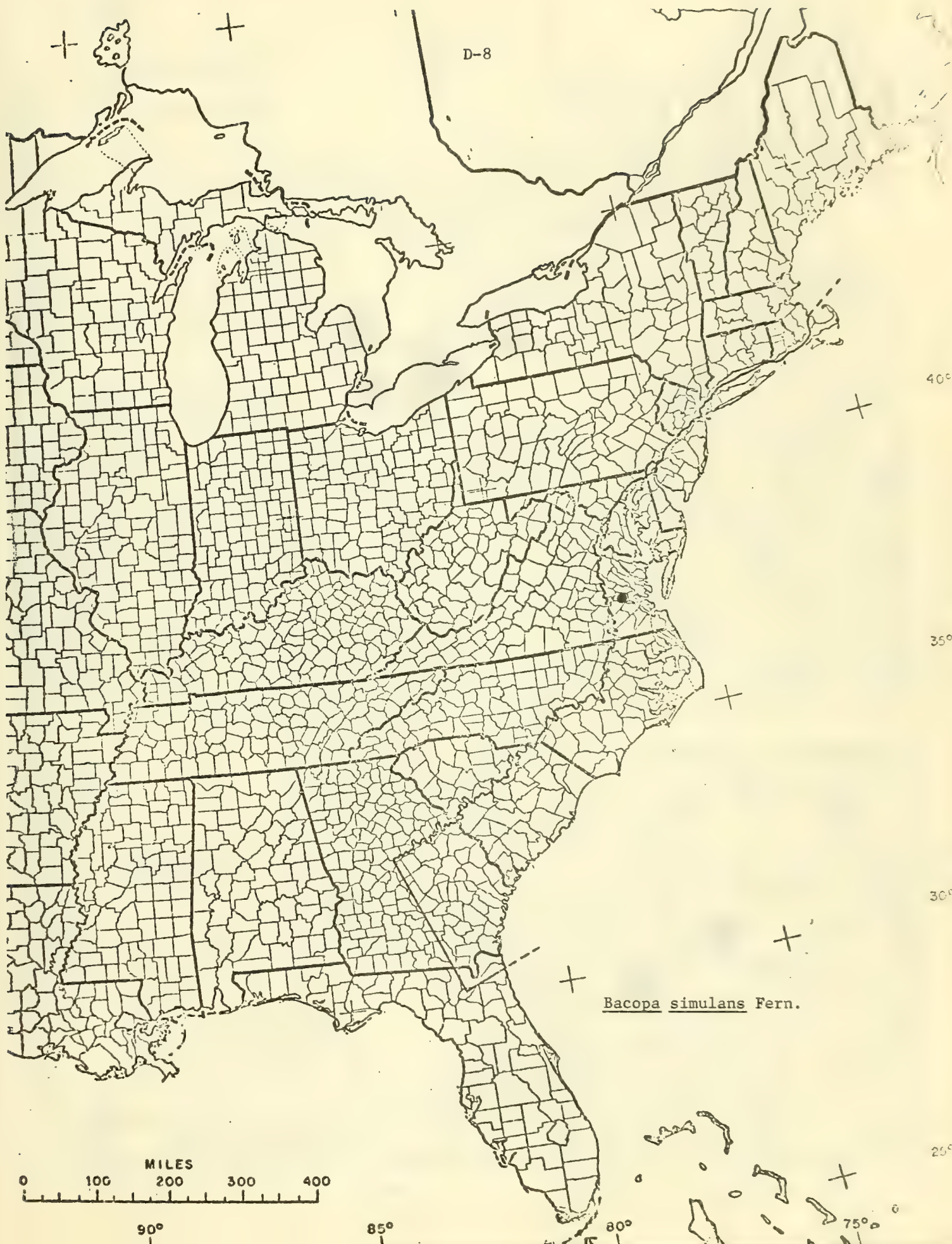
Habit: Low herb

Habitat: Wet tidal shores

Range: Chickahominy River; Charles City Co., Virginia.

Status: Very rare, endemic and possibly endangered.

Reference: M. L. Fernald. Rhodora, Vol. 44, p.438,
November, 1942.U.S. National Herbarium
Gray Herbarium



D-8

Bacopa simulans Fern.

MILES

0 100 200 300 400

90°

85°

80°

75°

40°

35°

30°

25°

Bacopa stragula Fern.

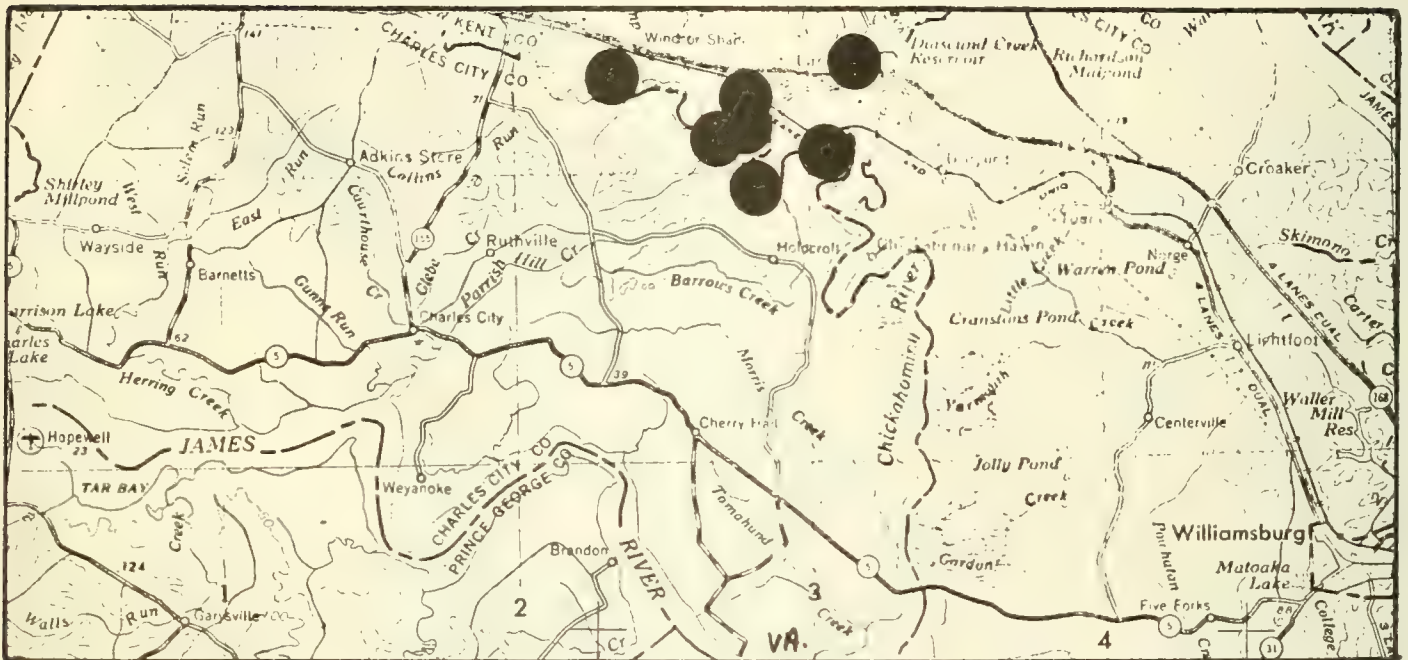
Water-hyssop

Habit: Low herb

Habitat: Wet tidal shores

Range: Chesapeake Bay drainage system; New Kent, Charles City and King William Cos., Virginia.

Status: Rare, endemic and possibly endangered.

Reference: M.L. Fernald, Rhodora, Vol. 44 p. 434, November, 1942.
U.S. National Herbarium.



D-10

Bacopa stragula Fern.

0 100 200 300 400
MILES

90°

85°

80°

75°

35°

30°

25°

LEGUMINOSAE

Baptisia pinetorum Larisey

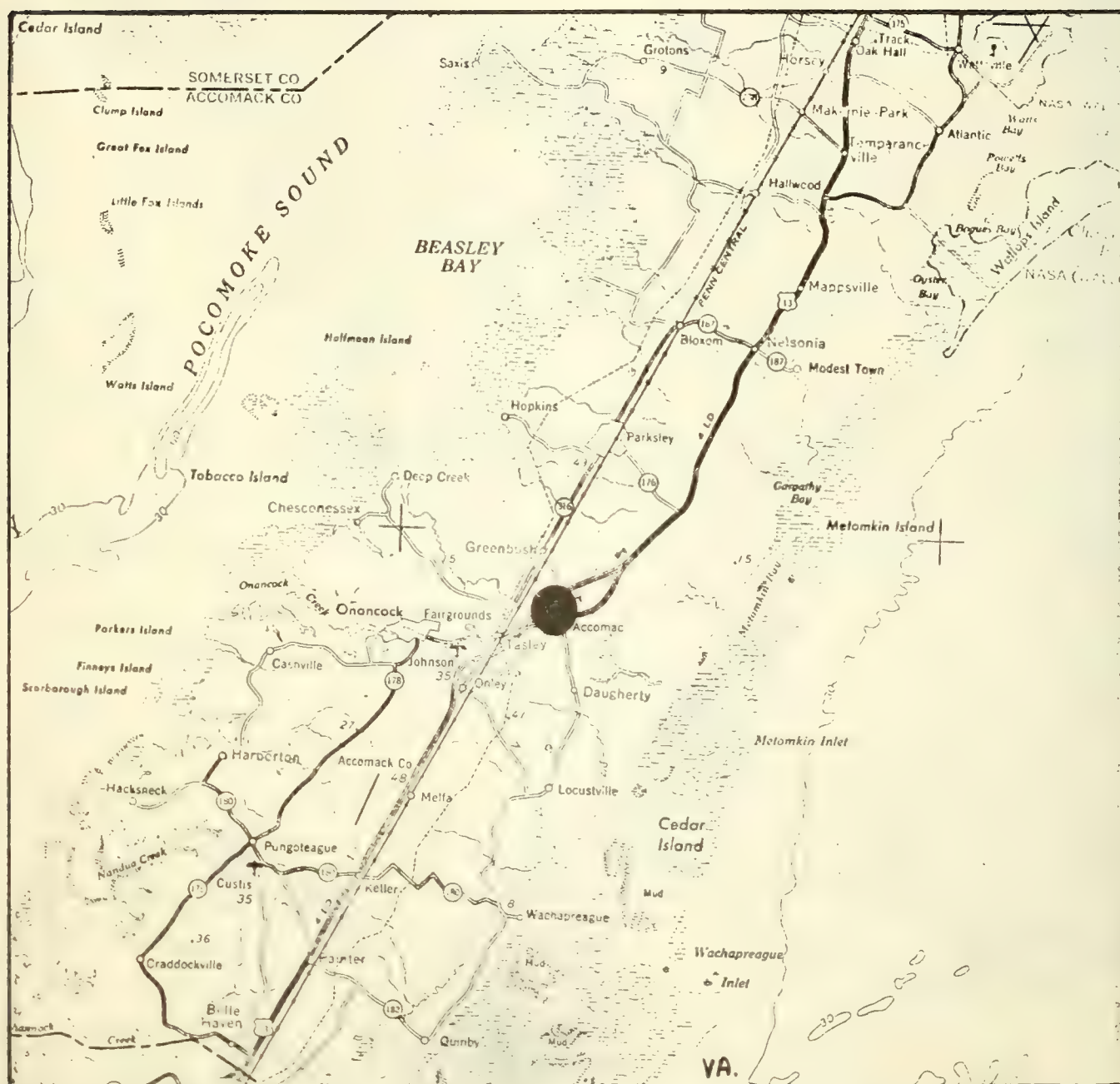
Habit: Herb

Habitat: Open woods and clearings

Range: Accomack Co., Virginia

Status: Very rare, endemic and probably endangered.

Reference: Dr. Clyde Reed, Reed Herbarium, Baltimore, Maryland.



D-12



Baptisia pinetorum Larisey

MILES

0 100 200 300 400

90°

85°

80°

75°

40°

35°

30°

25°

GRAMINEAE

Calamovilfa brevipilis var. calvipes Fern.

Habit: Herb

Habitat: Wet areas and sphagnum bogs

Range: Southeastern Virginia; Greensville and Brunswick Counties, Virginia.

Status: Very Rare

Reference: A.B. Massey, Virginia Flora, 1961.

D-14

40°

35°

30°

Calamovilfa brevipilis var. calvipes Fern.

25°

0 100 200 300 400
MILES

90°

85°

80°

75°

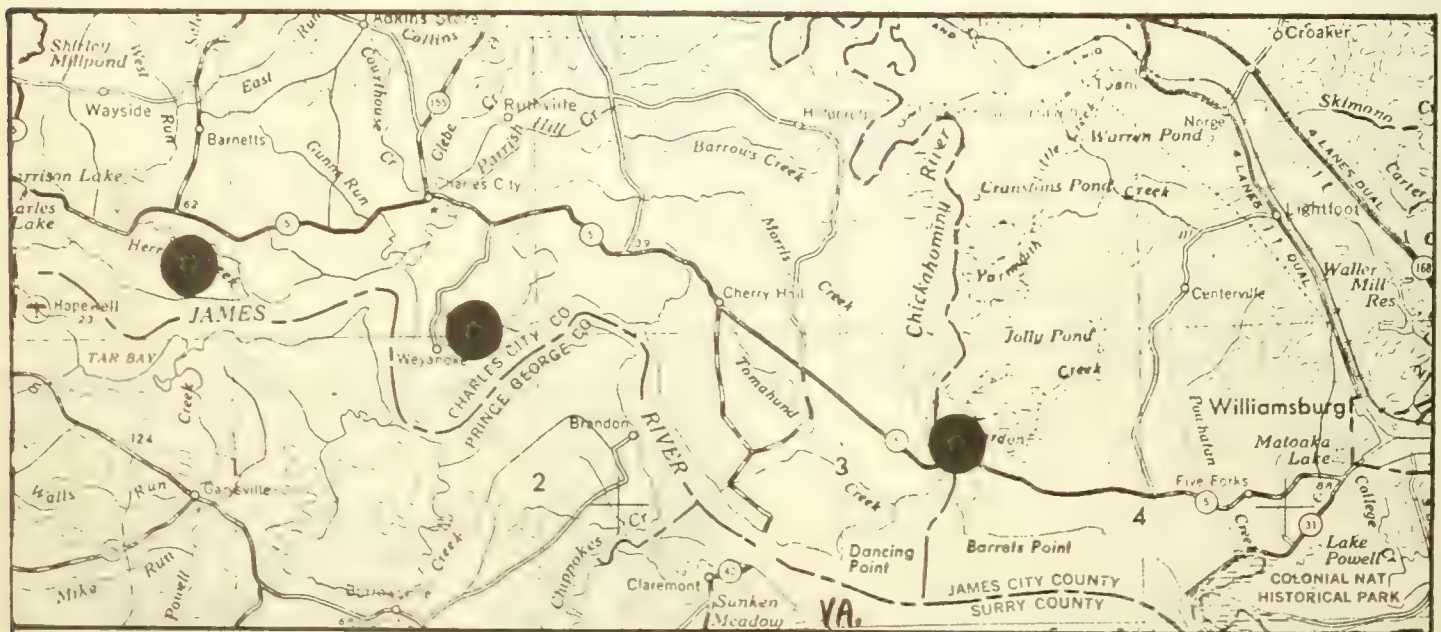
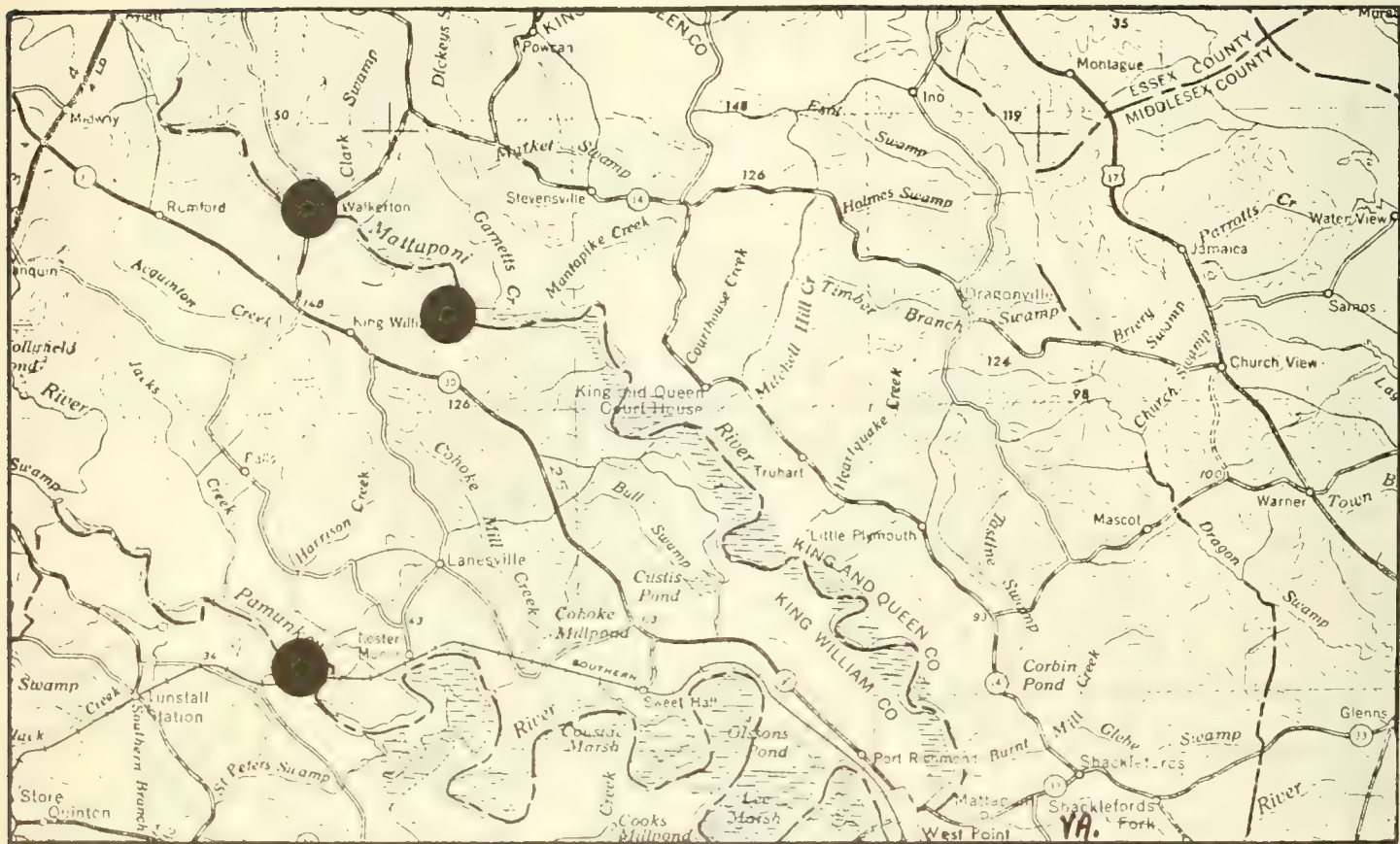
Cassia fasciculata var. macrosperma Fern, Partridge-Pea

Habit: Herb

Habitat: Tidal marshes

Range: Eastern Virginia; Charles City, James City, New Kent,
King William and King & Queen Cos., Virginia

Status: Endemic

Reference: M.L. Fernald, Rhodora, Vol. 42, p.455, November, 1940.



RUBIACEAE

Diodia teres var. hystericina Fern. & Grisc.

Buttonweed

Habit: Herb

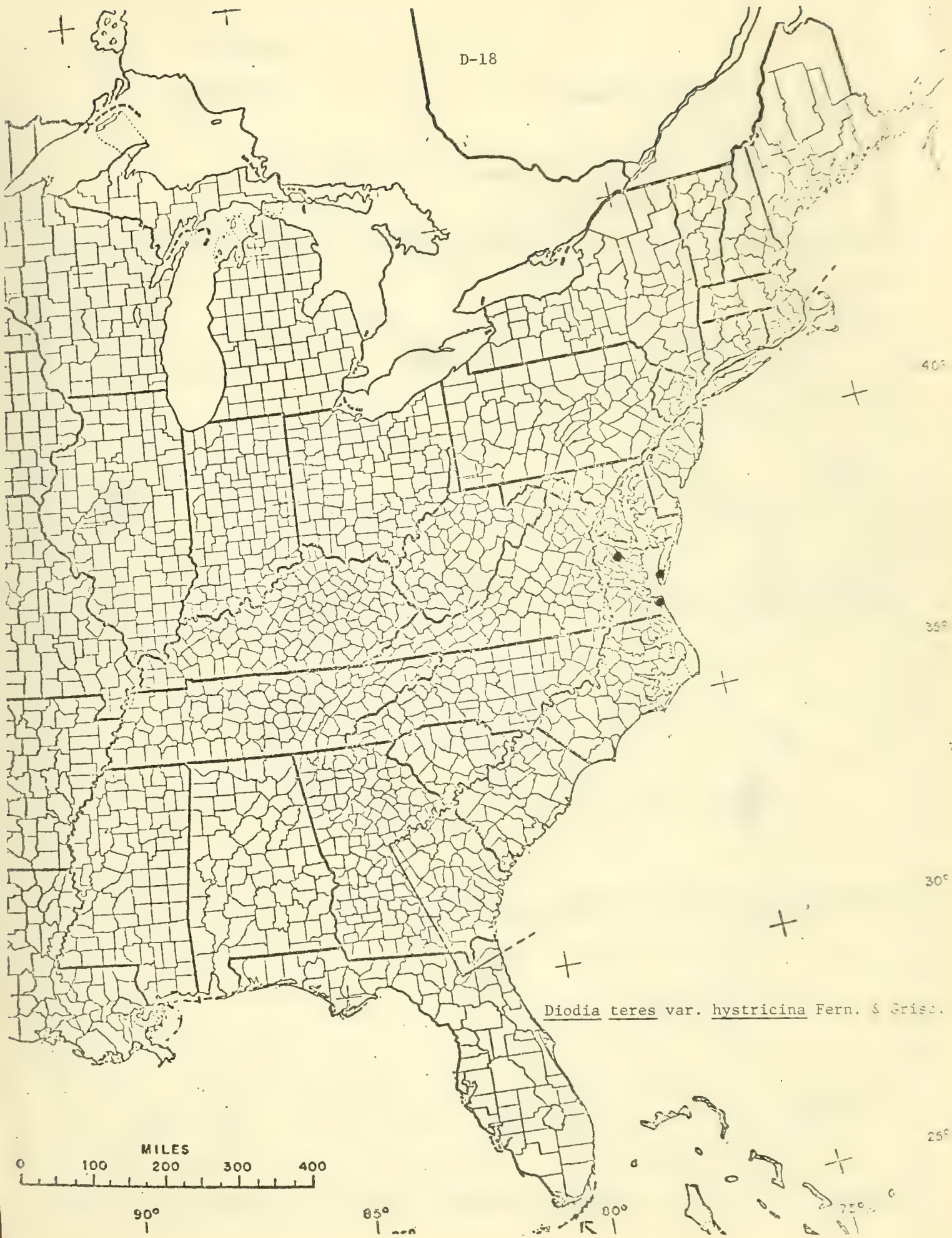
Habitat: Dry sands

Range: Coastal Virginia; Essex, Princess Anne and Northampton Counties, Virginia.

Status: Endemic

Reference: U.S. National Herbarium

D-18



Diodia teres var. hystricina Fern. & Griseb.

Eupatorium saltuense Fern,

Thoroughwort

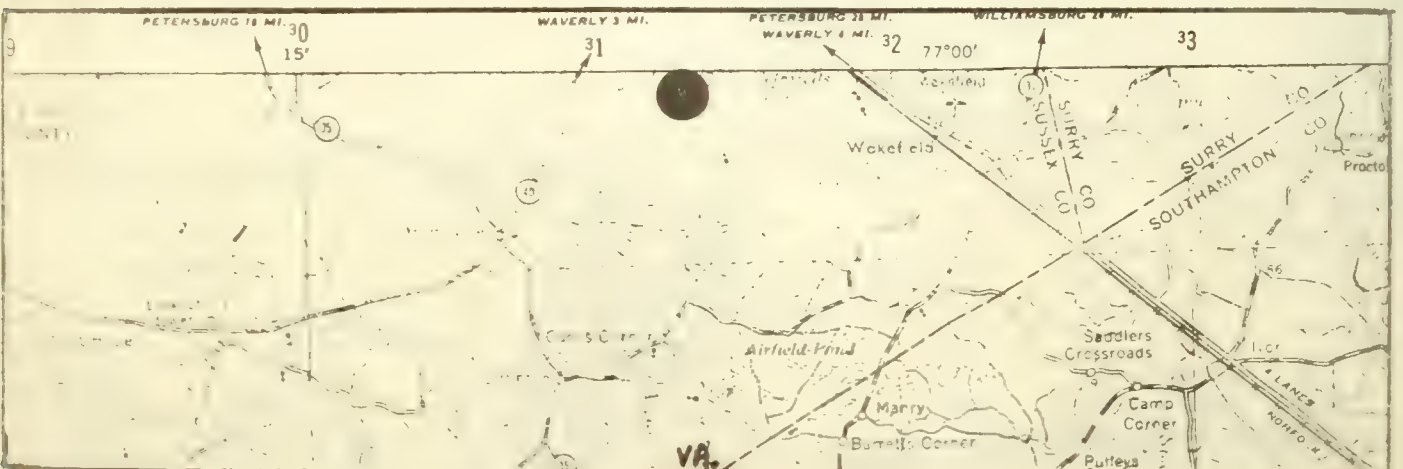
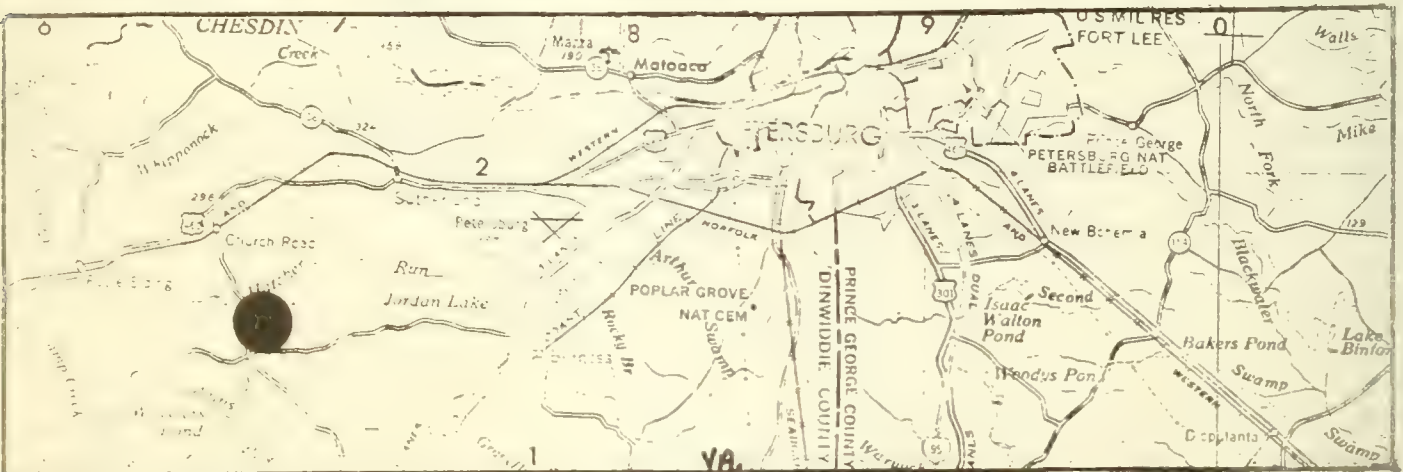
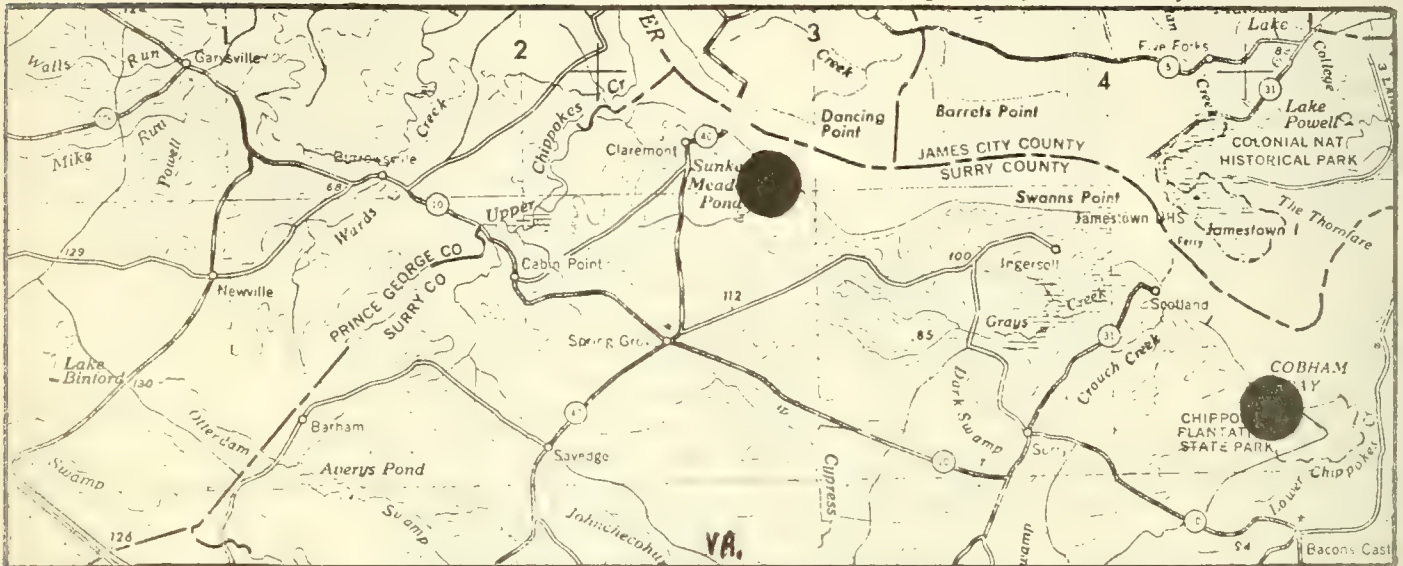
Habit: Herb

Habitat: Rich woods, thickets and clearings

Range: Southeastern Virginia; Surry, Sussex and Dinwiddie
Cos., Virginia

Status: Endemic and rare

Reference: M.L. Fernald, Rhodora, Vol. 44, p. 461, December, 1942.



D-20

Eupatorium saltuense Fern.

0 100 200 300 400
MILES

90° 80°

Eupatorium saltuense Fern.

MILES

0 100 200 300 400

90°

५०

800

Gaylussacia brachycera (Michx.) Gray

Box Huckleberry

Habit: Evergreen, low shrub

Habitat: Sandy woods and slopes

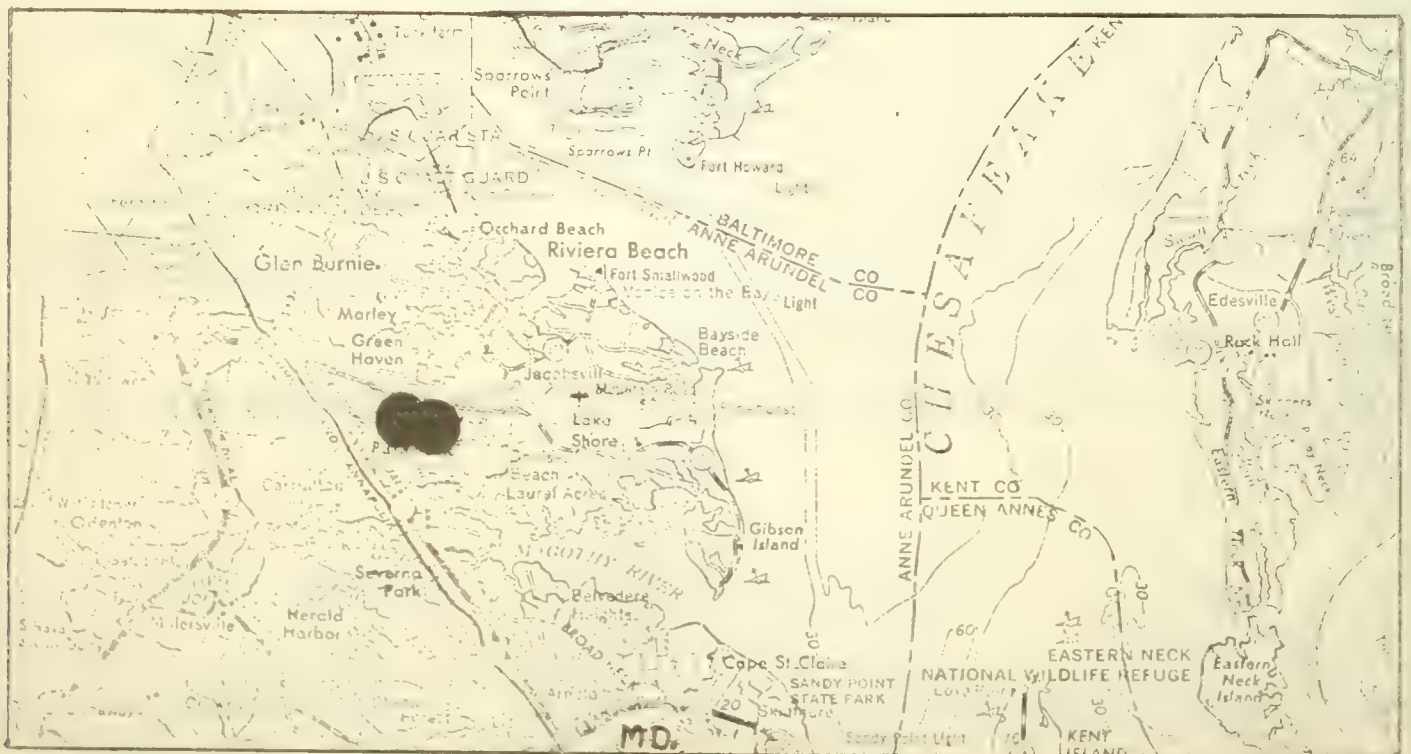
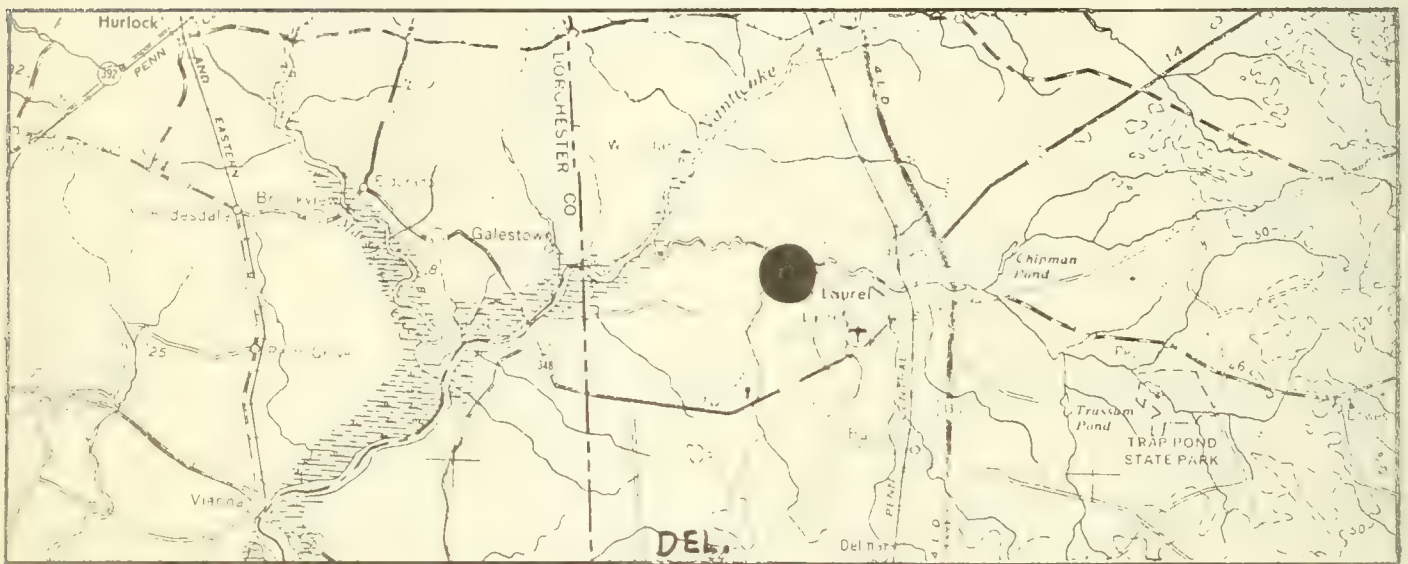
Range: Maryland and Delaware to Pennsylvania and Kentucky
and eastern Tennessee; very local except in W. Virginia;
Sussex Co., Delaware and Anne Arundel Co., Maryland.

Status: Rare in areas outside of West Virginia but of special
interest because it is possibly the oldest living plant.

Reference: H. N. Moldenke, Wildflower, Vol. 33, pp. 4-8,

January, 1957.

U.S. National Herbarium.



D-22

Gaylussacia brachycera (Michx.) Gray

MILES

0 100 200 300 400

90°

85°

80°

75°

JUNCACEAE

Juncus caesariensis Coville.

Habit: Herb

Habitat: Wet peaty places

Range: New Jersey; Southeastern Virginia; Glen Burnie, Anne Arundel Co., Maryland; Elko Station, Henrico, Burgers Station, Dinwiddie, and James City Counties, 3 miles West of Williamsburg, Virginia.

Status: Local. Rare.

Reference: U. S. National Herbarium
Gray Herbarium
A. B. Massey, Virginia Flora, 1961

D-24



Juncus caesariensis Coville.

JUNCACEAE

Juncus griscomi Fern.

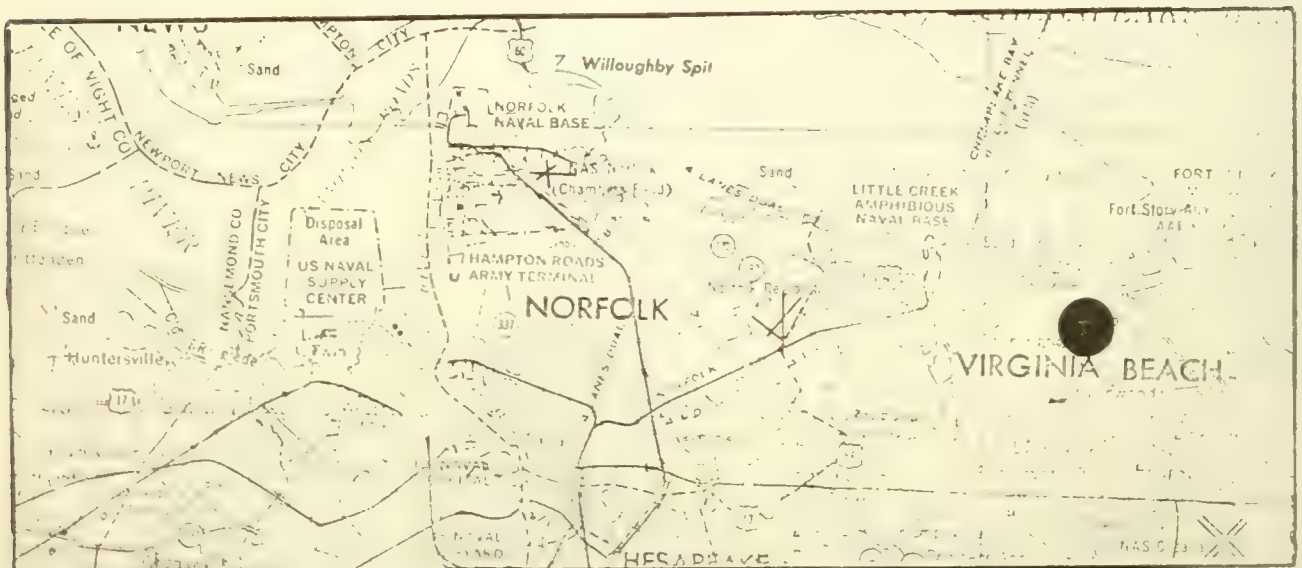
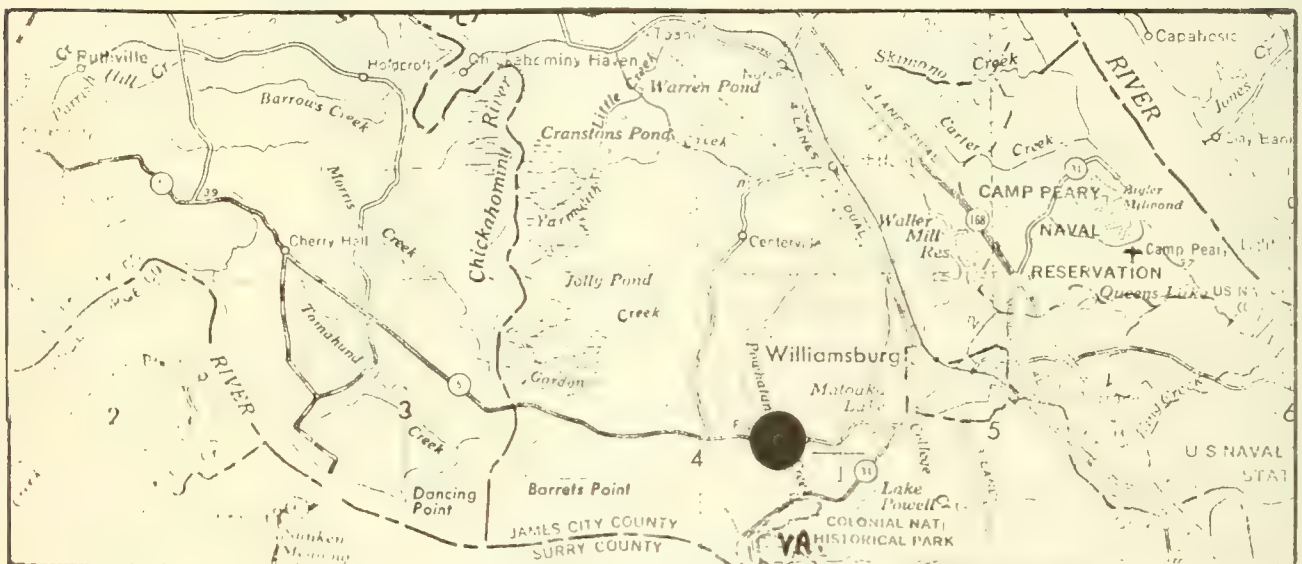
Habit: Herb

Habitat: Wet woodlands

Range: Princess Anne, James City and Norfolk Counties, Virginia.

Status: Endemic and rare.

Reference: M.L. Fernald, Rhodora 38: 401, Nov., 1936.
U.S. National Herbarium



D-26

40°

35°

30°

25°

Juncus griscomi Fern.

MILES

0 100 200 300 400

90°

85°

80°

75°

ACANTHACEAE

Justicia mortuifluminis Fern.

Habitat: Wooded bottomlands and shaded margins of quiet water.

Range: Southhampton, Surry, Nansemond counties, Virginia.

Status: Endemic and rare.

D-28

40°

35°

30°

25°

Justicia mortuifluminis Fern.

MILES

0 100 200 300 400

90°

85°

80°

CISTACEAE

Lechea maritima var. virginica Hodgdon

Pinweed

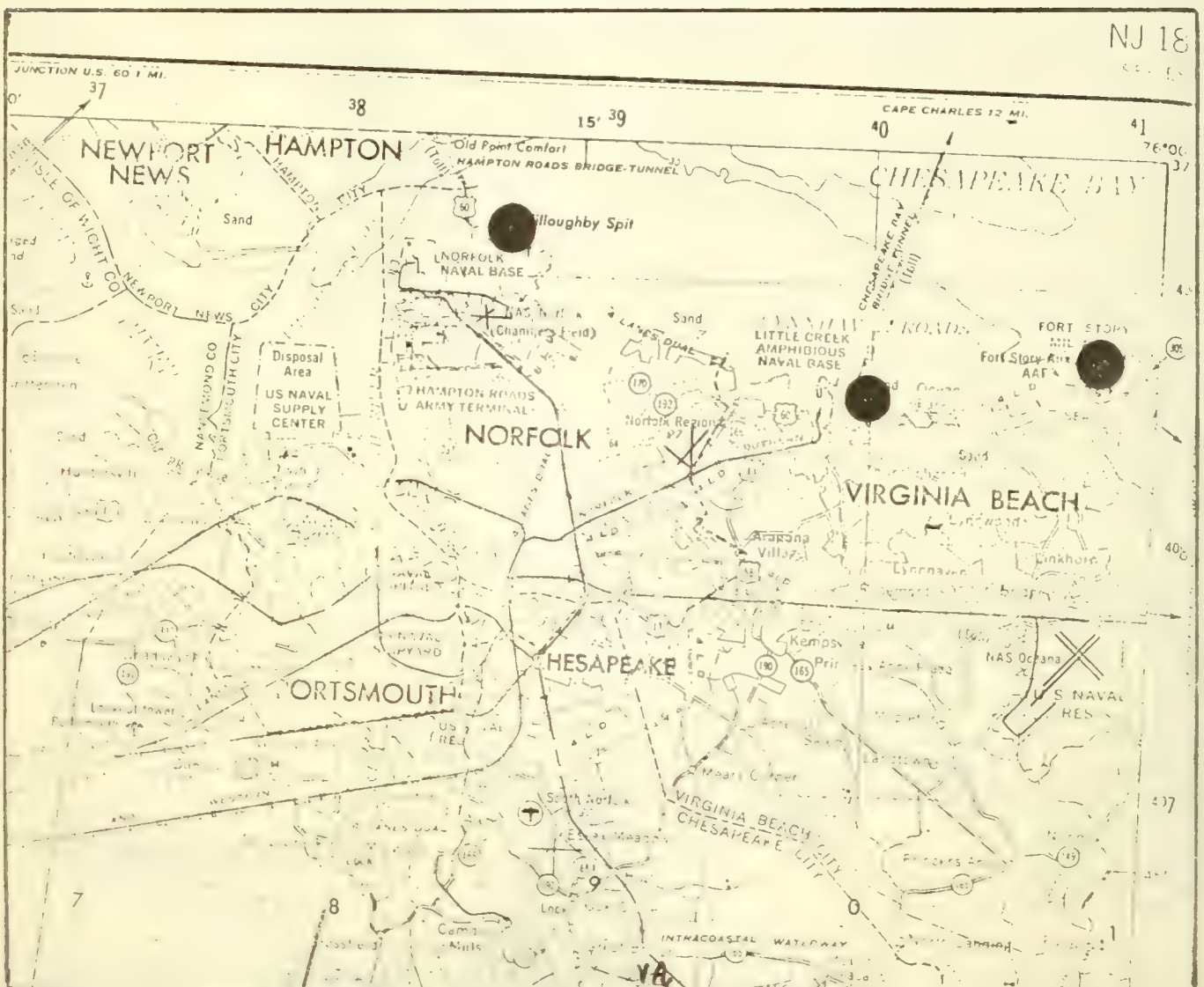
Habit: Herb

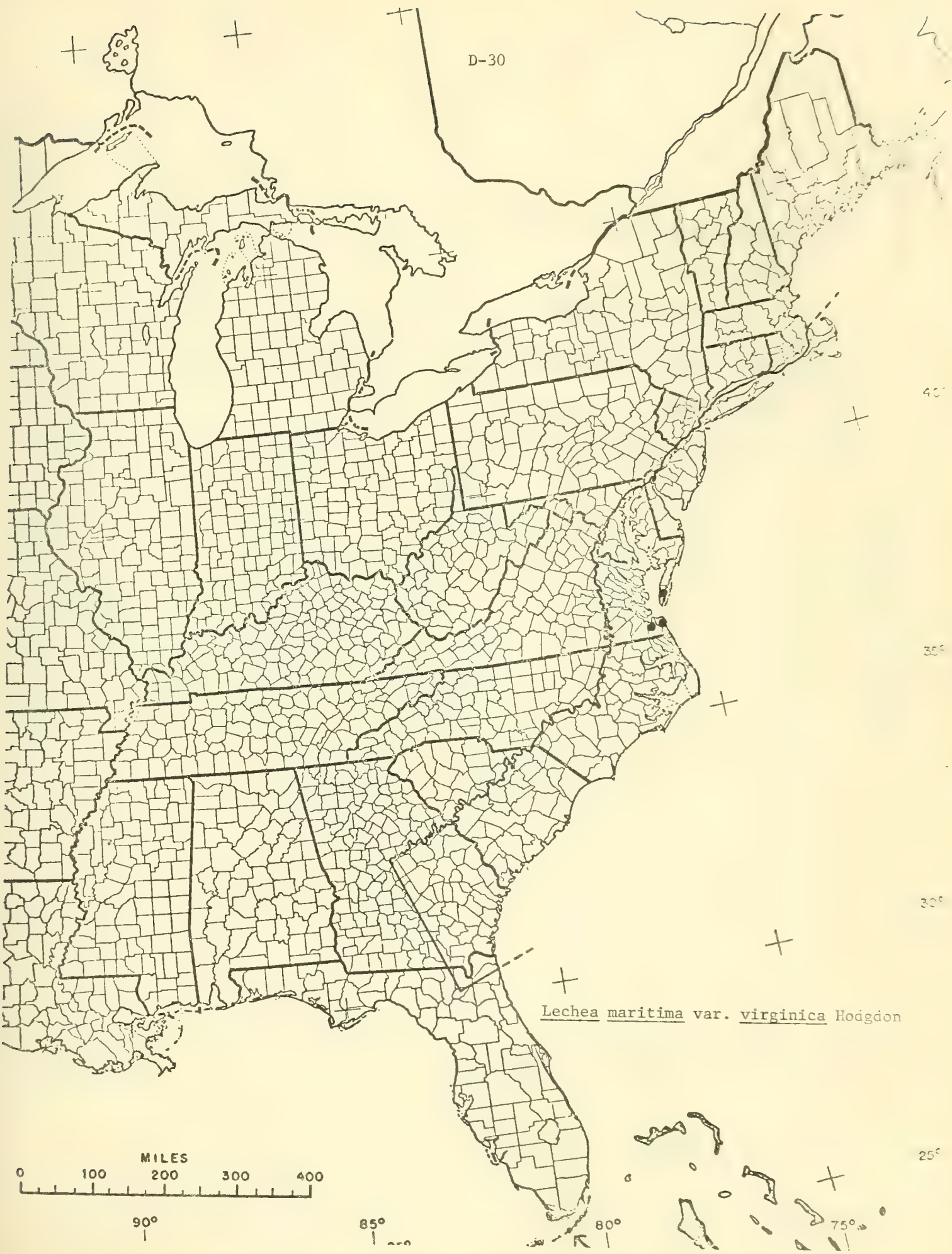
Habitat: Dunes and open sand flats

Range: Southeastern Virginia: Virginia Beach City, Norfolk and Northampton Counties, Virginia.

Status: Endemic and rare

Reference: Dr. Clyde Reed, Reed Herbarium, Baltimore, Maryland





D-30

Lechea maritima var. virginica Hodgdon

MILES

0 100 200 300 400

90°

85°

80°

75°

40°

35°

30°

25°

UMBELLIFERAE

Oxypolis canbyi (Coult. & Rose) Fern.

Parsley Family

Habit: Herb

Habitat: Meadows and bogs

Range: Hampton Co., South Carolina and Cooke Co., Lee Co.,
Georgia; Ellendale in Sussex Co., Bloomington, Delaware.

Status: Local, perhaps extinct.

References: National Herbarium
Gray Herbarium



D-32

Oxypolis Canbyi (Coult. & Rose) Fern.

MILES

0 100 200 300 400

90°

85°

80°

75°

40°

35°

30°

25°

GRAMINEAE

Panicum aculeatum Hitchc. & Chase

Habit: Herb

Habitat: Moist to wet woods

Range: Connecticut, Eastern New York to North Carolina; District
of Columbia and Arlington and Fairfax Counties, Virginia.

Status: Rare and little known.

References: Rhodora 8:209. 1906.

D-34

40°

35°

30°

25°

Panicum aculeatum Hitchc. & Chase

MILES

0 100 200 300 400

90°

85°

80°

75°

GRAMINEAE

Panicum mundum Fern.

Panic grass

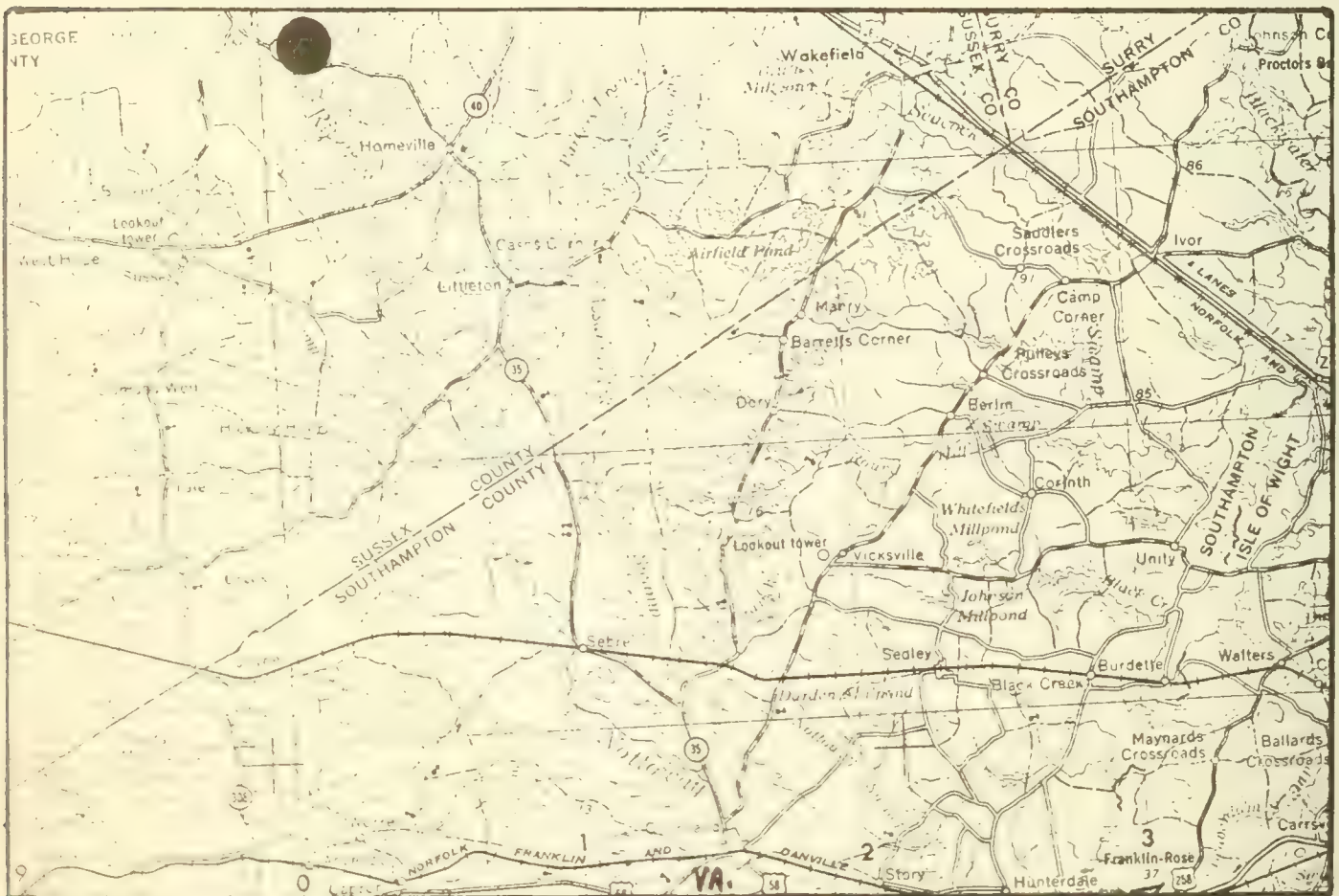
Habit: Herb

Habitat: Peaty soil

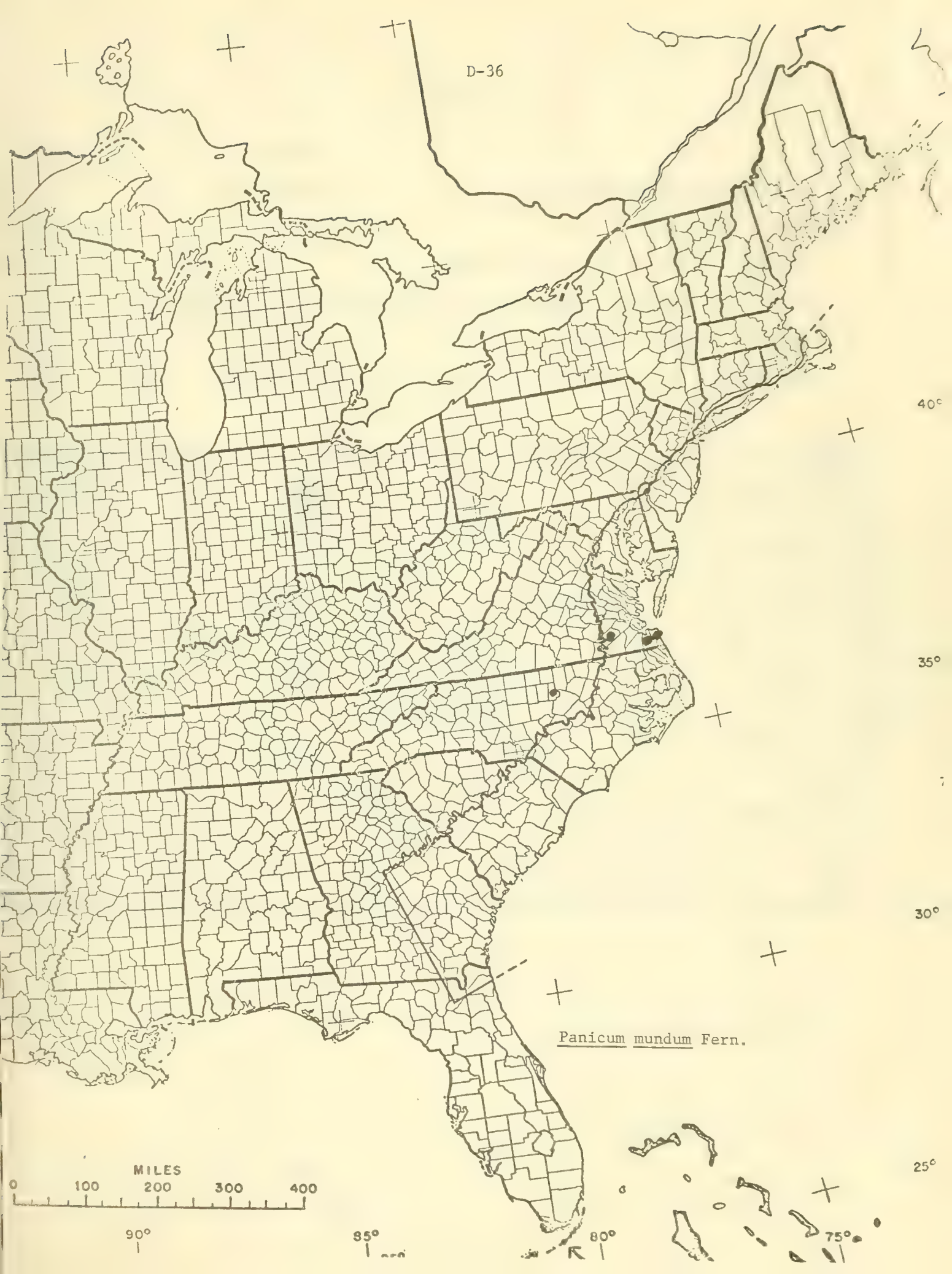
Range: Southeastern Virginia; Sussex, Princess Anne and Norfolk Counties, Virginia.

Status: Endemic and rare, possibly endangered.

Reference: M.L. Fernald, Rhodora, Vol. 38, p. 392, November, 1936.



D-36



Panicum mundum Fern.

LAMIACEAE

Pycnanthemum monotrichum Fern.

Mountain mint

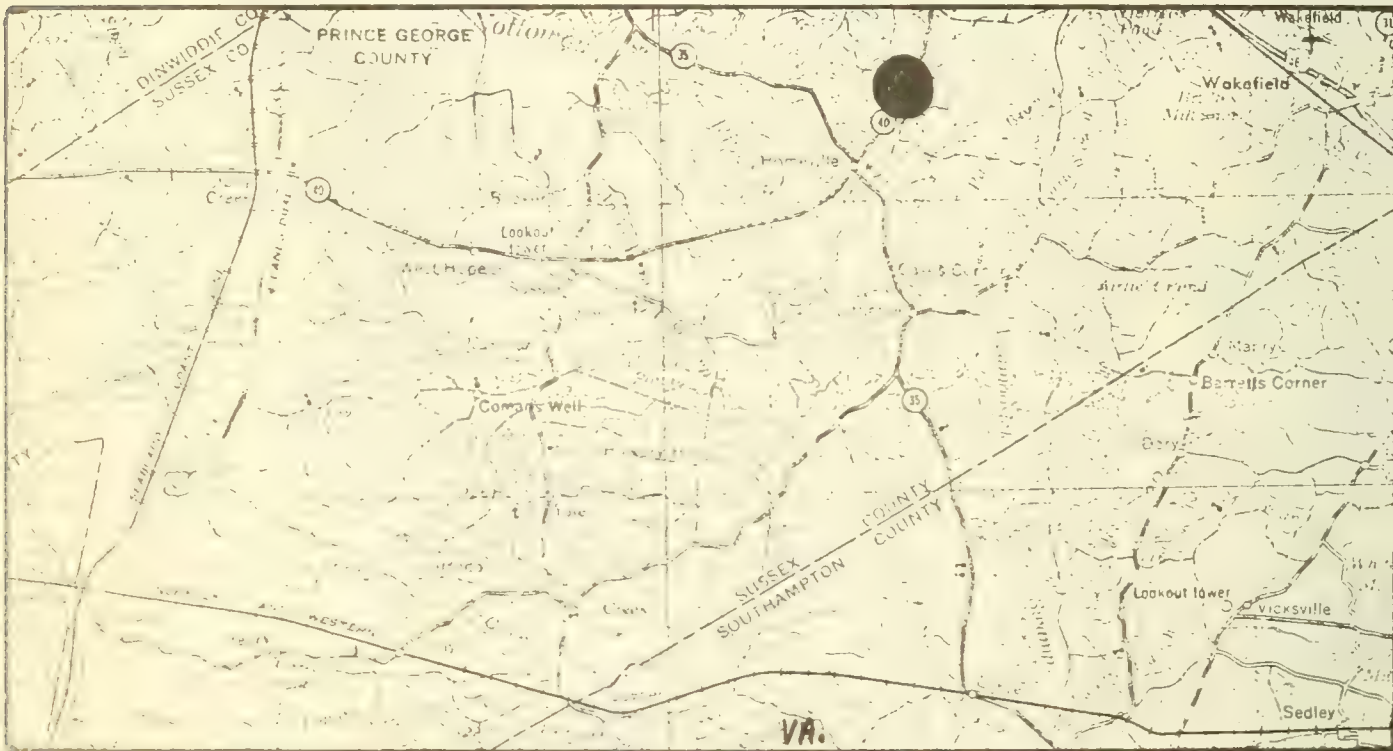
Habit: Herb

Habitat: Dry sandy woods and clearings

Range: Southeastern Virginia; Sussex and Nansemond Counties, Virginia.

Status: Endemic and rare

References: M.L. Fernald, Rhodora, Vol. 47, p. 176, May, 1945.



D-38

40°

35°

30°

25°

Pycnanthemum monotrichum Fern.

MILES

0

100

200

300

400

90°

85°

80°

75°

DIAPENSIACEAE

Pyxidanthera brevifolia Wells

Flowering moss; pyxie

Habit: Herb

Habitat: Sandy pine barrens

Range: Burlington, New Jersey; Ocean, Moumouth and Atlantic
Cos., South Carolina; Nansemond, and South of Zuni and
South of Lee's Mill, Isle of Wight Counties, Virginia.

References: Gray Herbarium
A. B. Massey, Virginia Flora, 1961.



COMPOSITAE

Rudbeckia heliopsidis T. & G.

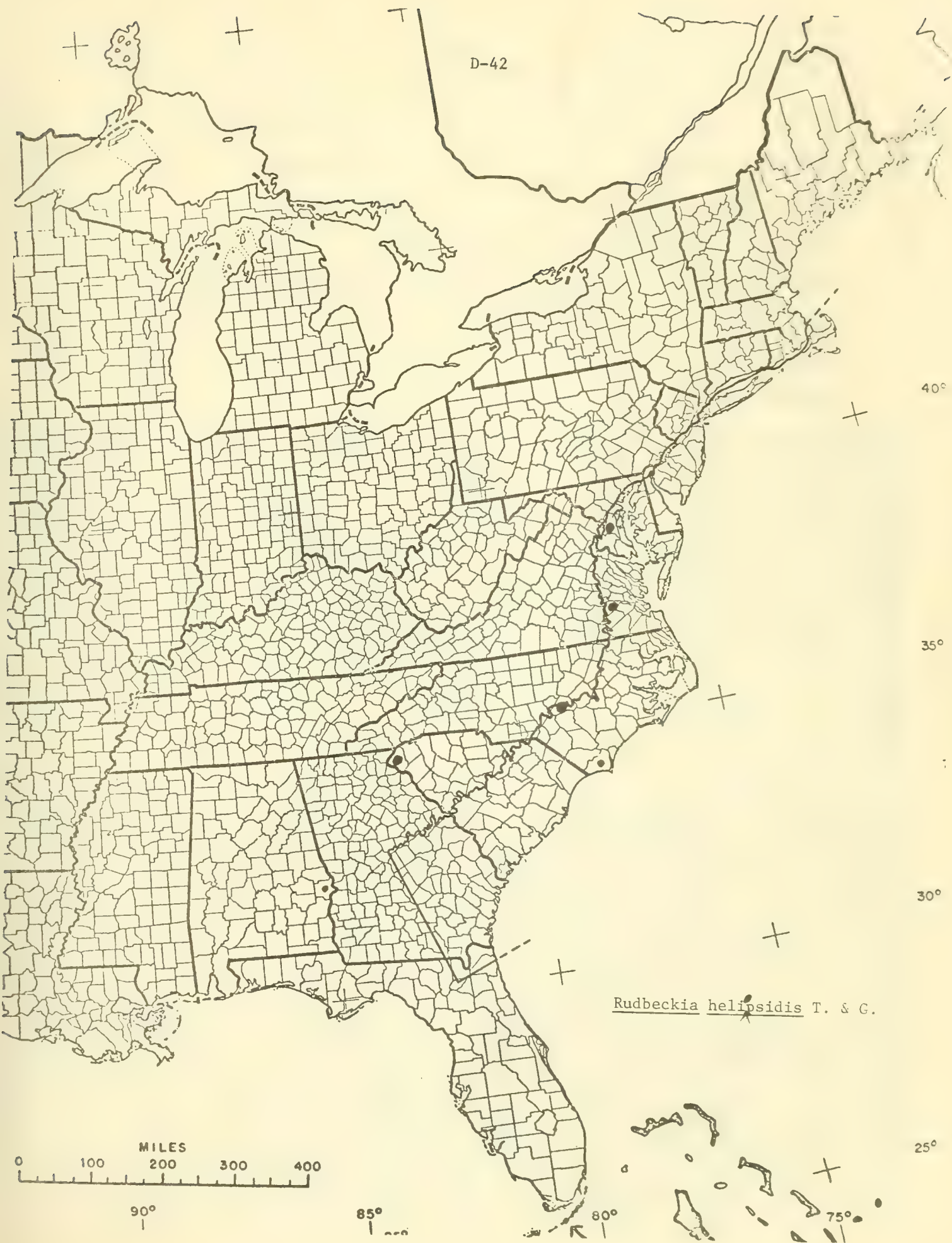
Habit: Herb

Habitat: Dry woods - pine and oak woods and thickets.

Range: Southeastern Virginia, Georgia and Alabama; 2 to 3
miles North of Disputanta, Prince George County,
Virginia; South Carolina and North Carolina.

Status: Very local; rare.

Reference: National Herbarium
North Carolina State University Herbarium



SCROPHULARIACEAE

Schwalbea americana L.

Chaffseed

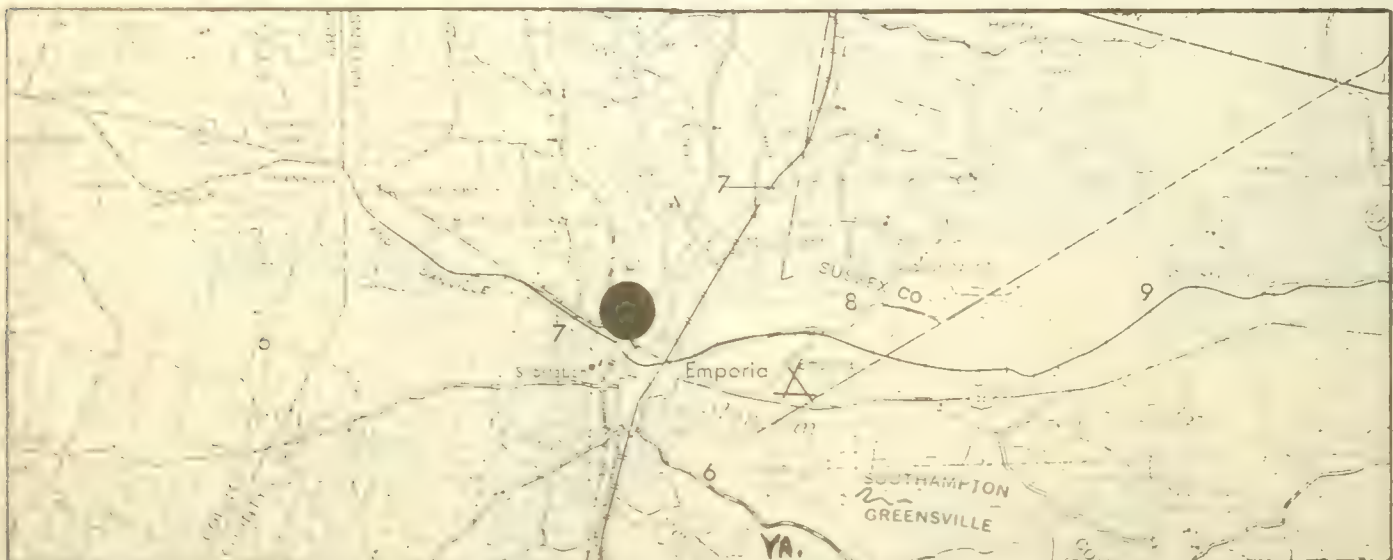
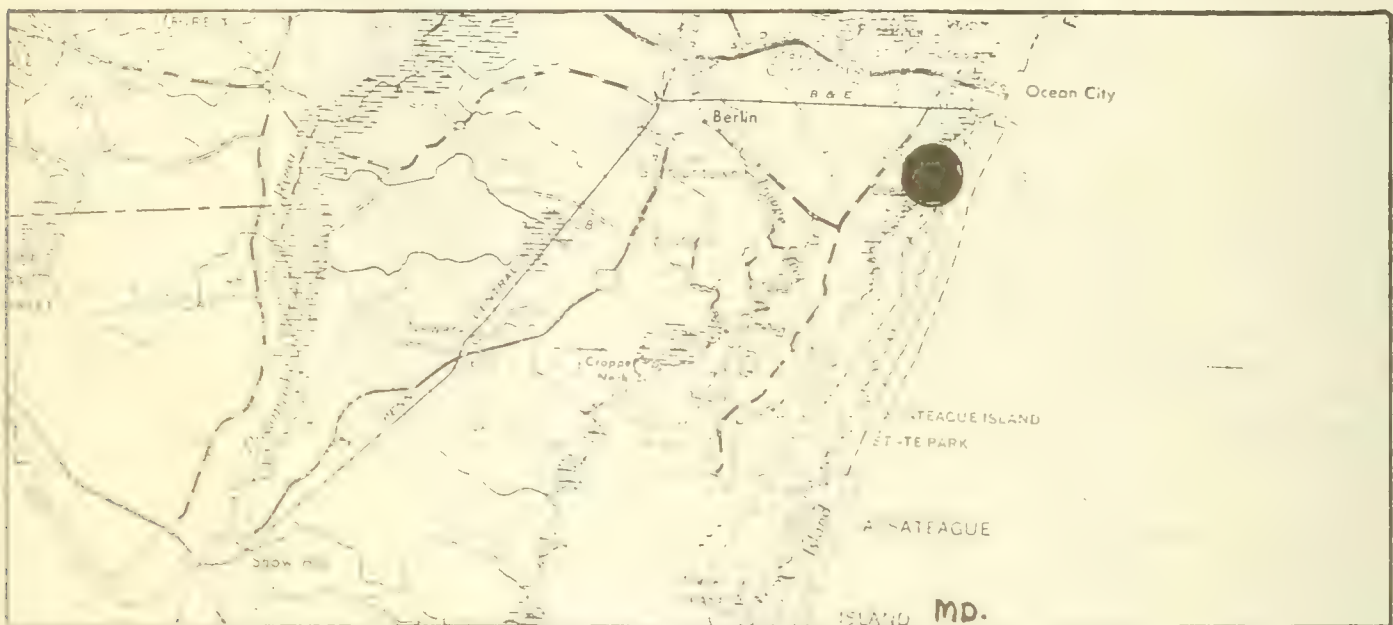
Habit: Herb

Habitat: Moist sandy soil; pinelands, oakwoods and clearings.

Range: New England south to Florida and Texas; Wicomico and Worcester Counties, Maryland; New Castle County, Delaware; and Greenville County, Virginia.

Status: Rare and endangered

Reference: U.S. National Herbarium
Gray Herbarium





CYPERACEAE

Scirpus flaccidifolius (Fern.) Schuyler

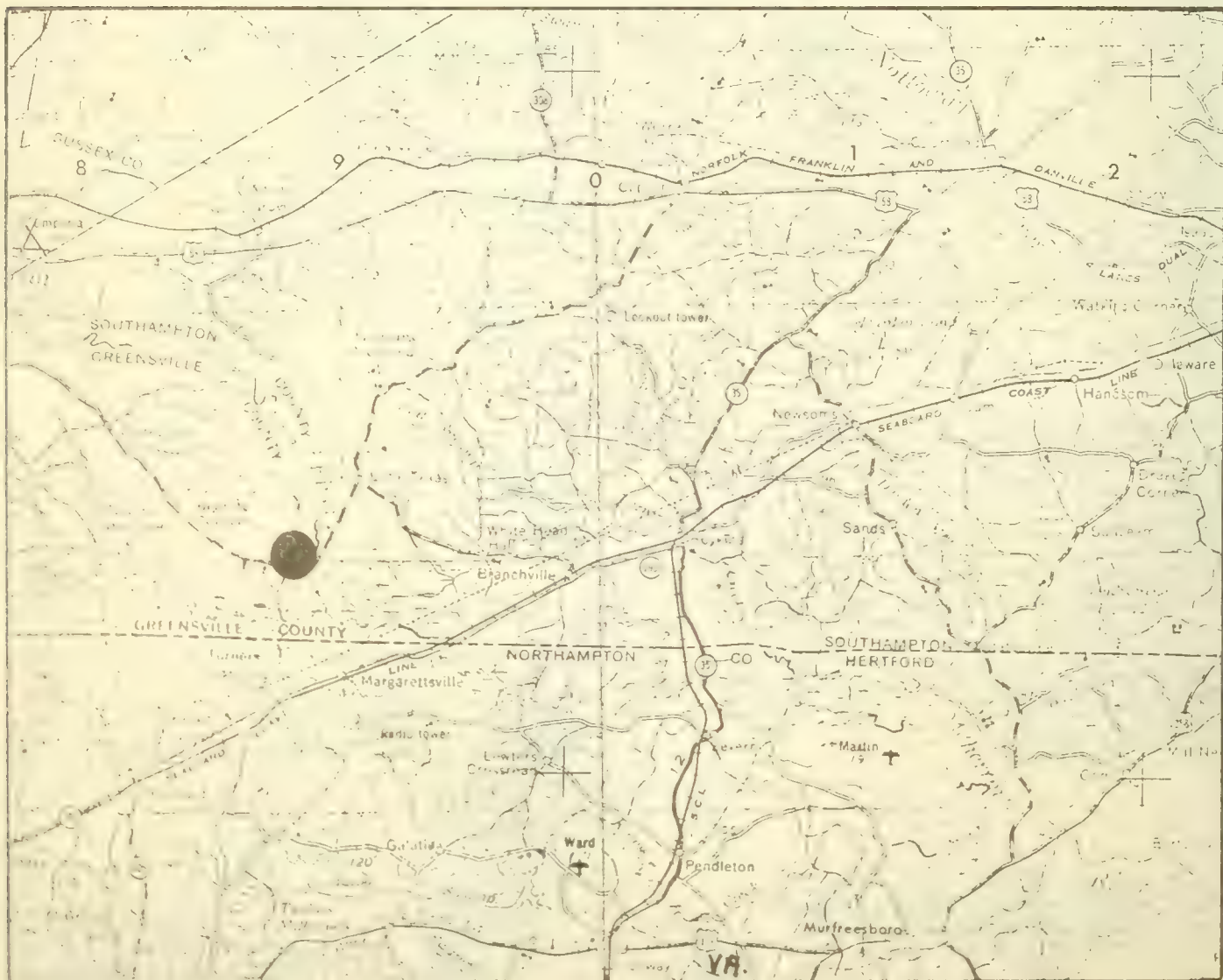
Habit: Herb

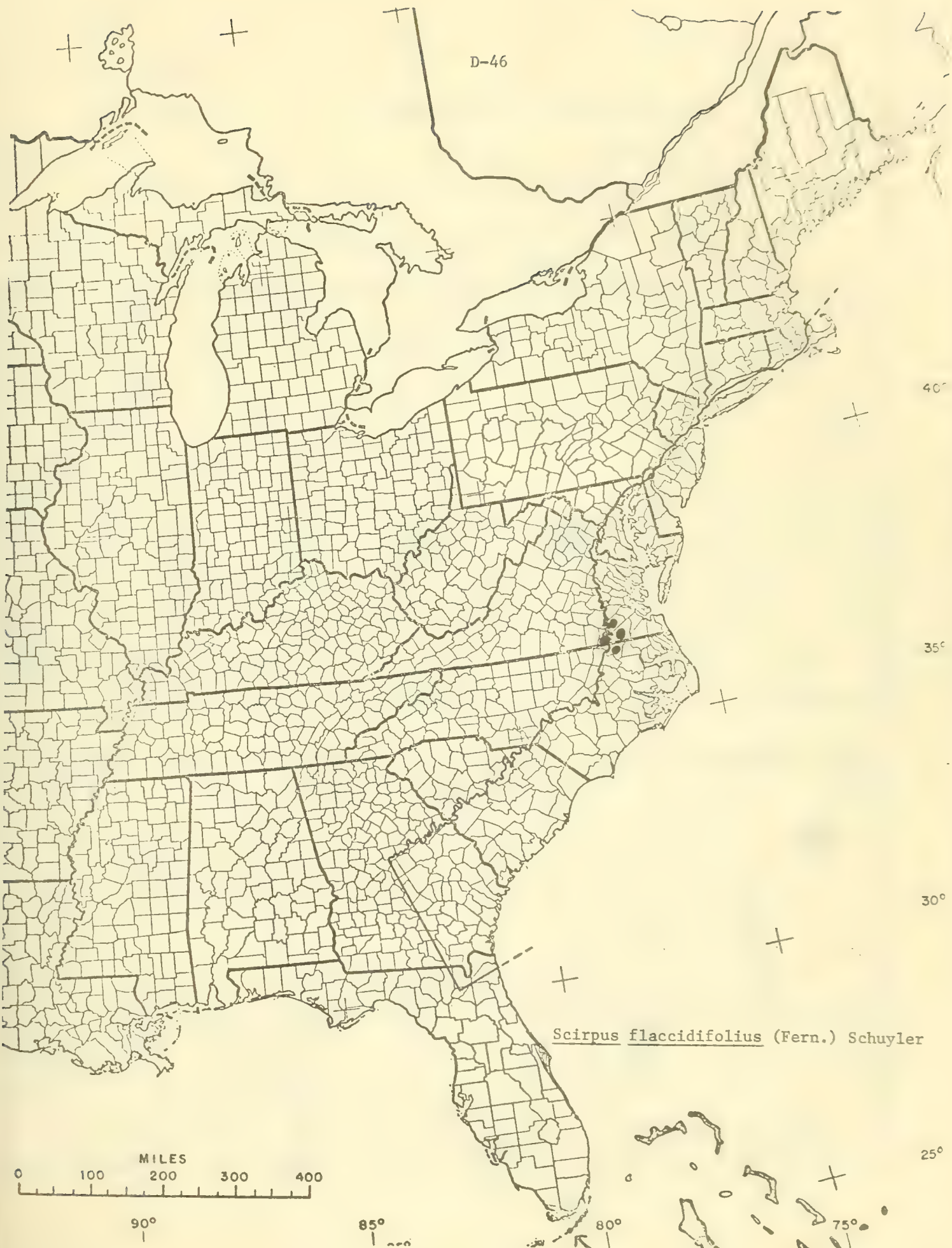
Habitat: Wooded alluvial bottomland

Range: Southeastern Virginia and northeastern North Carolina; Southampton County, Virginia.

Status: Endemic and rare.

References: Dr. A.E. Schuyler, Rhodora 69: 198-202, 1967.
U.S. National Herbarium





D-46

40°

35°

30°

Scirpus flaccidifolius (Fern.) Schuyler

25°

MILES

0 100 200 300 400

90°

85°

80°

75°

Trillium pusillum var. virginianum Fern.

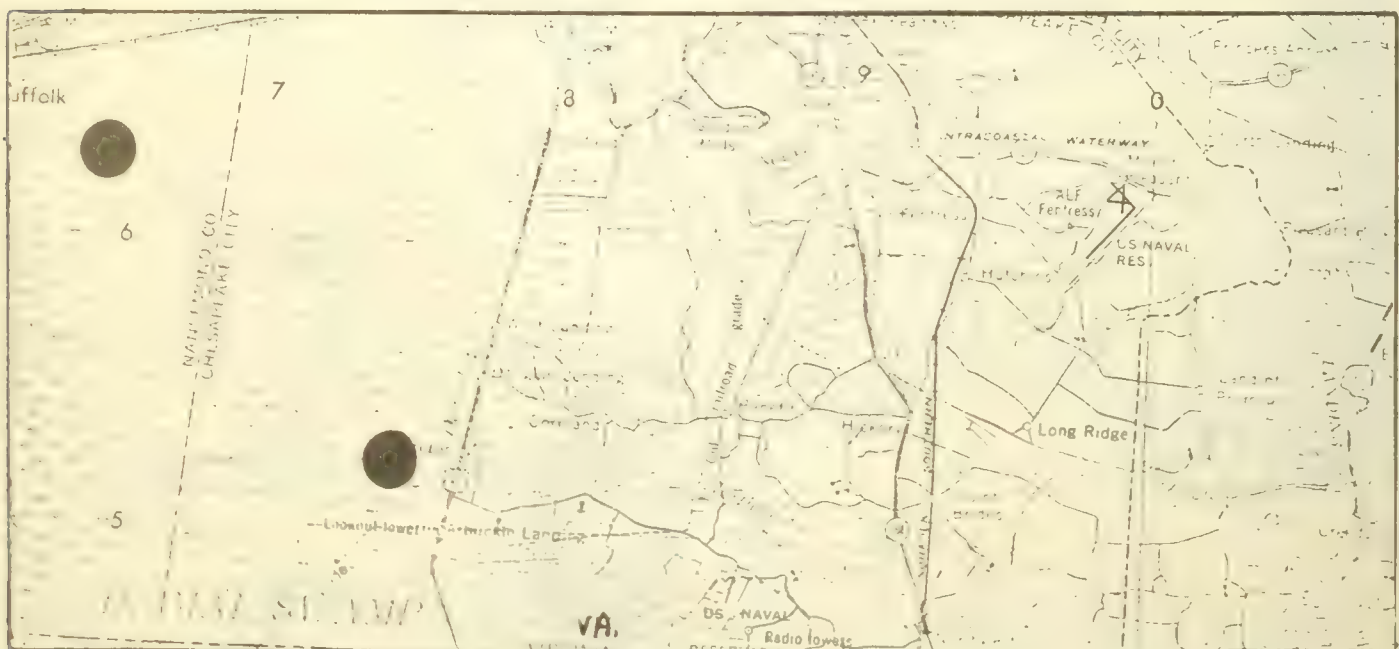
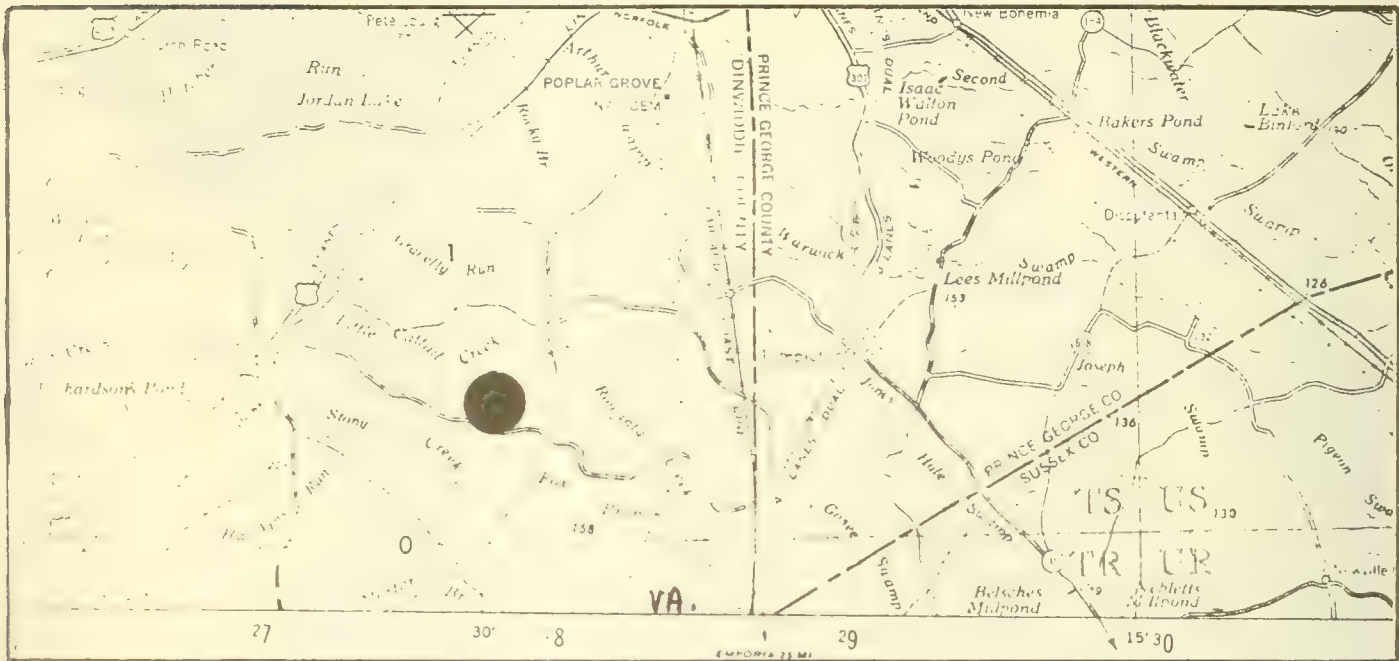
Trillium

Habit: Herb

Habitat: Damp woodlands

Range: Southeastern Virginia, Nansemand Co. and Chesapeake City, Virginia.

Status: Rare and endangered

Reference: Brooke Meanley, Atlantic Naturalist, Vol. 24,
No. 1, Summer 1969

D-48

40°

35°

30°

25°

Trillium pusillum var. virginianum Fern.

MILES

100

200

300

400

90°

85°

80°

75°

APPENDIX E

PRESENTLY PROTECTED AREAS OF CHESAPEAKE BAY

David W. Kunhardt
Research Assistant

and staff

SUMMARY OF PRESENTLY PROTECTED AREAS OF CHESAPEAKE BAY

| <u>Ownership</u> | <u>Number of Sites</u> | <u>Acres</u> | <u>Hectares</u> ¹ |
|--|------------------------|--------------|------------------------------|
| FEDERAL | | | |
| Military | 43 | 266,000 | 107,500 |
| National Wildlife Refuges ² | 8 | 32,400 | 13,100 |
| Other | 20 | 56,200 | 22,700 |
| STATE | | | |
| Forests | 5 | 20,750 | 8,380 |
| Parks | 36 | 56,760 | 22,930 |
| Wildlife Management Areas ³ | 30 | 78,700 | 31,800 |
| Other | 26 | 80,600 | 32,570 |
| PRIVATE OR QUASI-PUBLIC | 8 | 10,770 | 4,350 |
| | Total | 602,200 | 243,300 |

¹The hectare is a unit of area in the metric system. One hectare equals 10,000 square meters or 2.471 acres. There are approximately 258 hectares per square mile.

²Includes some land not in the N.W.R. system but administered by the U. S. Department of Interior's Bureau of Sport Fisheries and Wildlife.

³Includes some land not in the W.M.A. systems but held with identical management practices. Also includes Virginia Natural Areas.

PRESENTLY PROTECTED AREAS OF CHESAPEAKE BAY REGION

State of Maryland

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|------------------|--|----------------------------|-----------------|---------------------------|
| NATIONAL | | | | |
| Military | | | | |
| Air Force | USAF Transmitter Station Reservation | Anne Arundel | 420 | 7-G |
| Army | Aberdeen Proving Grounds (Annex) | Harford | 129 | 2-J |
| | Aberdeen Proving Grounds Reservation | Harford | 13,445 | 2-K, 3-K, 3-L 4-J, 4-K |
| | Atkisson Reservoir (Army Chemical Center) | Harford | 242 | 3-J |
| | Ft. George Meade Military Reservation | Anne Arundel | 5,252 | 6-F, 6-G |
| | US Military Reservation (Globecom Radio Receiving Station) | Prince Georges | 687 | 9-F |
| | US Military Reservation (Army Radio Receiving Center) | Charles | 242 | 10-E |
| | Bloodsworth Island Bombing Range | Dorchester | 1,940 | 13-L |
| | | Subtotal (Army) | 21,937 | |
| Navy | US Naval Ordnance Lab | Montgomery, Prince Georges | 388 | 6-E |
| | US Naval Academy Dairy | Anne Arundel | 283 | 6-G |
| | US Naval Reservation | Anne Arundel | 388 | 7-I |
| | US Naval Reservation | Prince Georges | 263 | 8-F, 9-F |
| | US Naval Propellent Plant, Indian Head | Charles | 889 | 10-C |
| | US Naval Research Lab, Cedar Point Neck | Charles | 566 | 11-D |
| | US Naval Reservation | St. Marys | 2,424 | 12-I |
| | US Naval Air Base | St. Marys | 388 | 13-I |
| | | Subtotal (Navy) | 5,5 | |
| | | Total (Military) | 27,946 | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|--|--|------------------------------|-----------------|------------------------------------|
| NATIONAL | | | | |
| National Wildlife Refuges (NWR) | Susquehanna NWR | Harford | 4,050 | 3-L |
| | US Dept. of Interior Wildlife Research Center | Prince Georges, Anne Arundel | 287 | 6-F |
| | Eastern Neck NWR | Kent | 923 | 6-K |
| | Blackwater NWR | Dorchester | 4,531 | 11-K |
| | Martin NWR | Somerset | 1,786 | 14-L, 14-M, 15-L, 15-M |
| | | Total (NWR) | 11,579 | |
| National Forests, Parks & Others (NFP) | US Dept. of Agriculture Research Center | Prince Georges | 3,878 | 6-E, 6-F |
| | Greenbelt Park | Prince Georges | 485 | 7-E |
| | St. Elizabeth's Farm | Prince Georges | 186 | 8-D |
| | Ft. Foote Park | Prince Georges | 32 | 8-D |
| | Ft. Washington National Park | Prince Georges | 137 | 9-D |
| | Piscataway Park | Prince Georges, Charles | 1,414 | 9-D |
| | | Total (NFP) | 6,132 | |
| | | Total (NATIONAL) | 45,657 | |
| STATE | | | | |
| Forests | Elk Neck State Forest | Cecil | 1,108 | 2-M |
| | Cedarville State Forests | Prince Georges, Charles | 1,414 | 9-F, 10-F |
| | Doncaster State Forests | Charles | 591 | 10-C |
| | Eastern Shore Experimental Forest or Wicomico State Forest | Wicomico | 444 | 12-Q |
| | Pocomoke State Forest | Worcester | 4,828 | 12-P, 12-Q, 13-P, 13-Q, 14-P, 14-Q |
| | | Total (Forests) | 8,385 | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|------------------|---|-----------------------|-----------------|---------------------------|
| STATE Parks | Rock Ridge in Deer Creek State Park | Harford | 263 | 2-J |
| | Susquehanna State Park | Harford | 646 | 2-K |
| | Baltimore Falls State Park | Baltimore | 2,424 | 3-H, 3-I |
| | Elk Neck State Park | Cecil | 566 | 3-L, 3-M |
| | Patapsco State Park | Baltimore, Howard | 2,510 | 4-F, 5-F, 5-G |
| | Gunpowder State Park | Baltimore | 323 | 4-J |
| | Savage Park | Howard | 61 | 5-F |
| | Guilford Park | Howard | 182 | 5-F |
| | Ft. Smallwood State Park | Anne Arundel | 40 | 5-I |
| | Severn Run Natural Environment Area | Anne Arundel | 646 | 6-G, 6-H |
| | Sandy Point State Park | Anne Arundel | 283 | 6-I |
| | Anacostia River Park + Indian Creek Park + Northwest Branch Park | Prince Georges | 606 | 7-E |
| | Robert Watkins State Park | Prince Georges | 194 | 7-F |
| | Wye Oak State Park | Talbot | 9 | 7-L |
| | Tuckahoe State Park | Queen Annes, Caroline | 1,535 | 7-M |
| | Poplar Island, Jefferson and Coaches Island | Talbot | 50 | 8-J, 9-J |
| | Martinak State Park | Carolina | 69 | 8-N |
| | Cosca Regional Park | Prince Georges | 202 | 9-E |
| | Smallwood State Park | Charles | 137 | 10-C |
| | Calvert Cliffs State Park | Calvert | 606 | 11-I |
| | Burce State Park | Charles | 57 | 11-B |
| | St. Mary's River | St. Marys | 283 | 12-H |
| | St. Clement's Island | St. Marys | 28 | 13-G |
| | Milburn Landing State Park | Worcester | 101 | 13-Q, 14-Q |
| | Shad Landing State Park | Worcester | 220 | 13-Q |
| | Point Lookout State Park | St. Marys | 190 | 14-J |
| | Jane's Island State Park | Somerset | 1,159 | 14-M, 14-N, 15-M, 15-N |
| Total (Parks) | | | 13,390 | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|--|---|----------------|-----------------|---------------------------|
| STATE Wildlife Management Areas (WMA) | Elkton WMAs | Cecil | 356 | 2-M, 2-N, 3-M, 3-N |
| | C & D Canal Lands (Wildlife Management Agreement) | Cecil | 1,212 | 2-N |
| | Millington Wildlife Demonstration Area | Kent | 889 | 4-N |
| | Merkle WMA (on Patuxent River) | Prince Georges | 444 | 9-G |
| | Idylwild Wildlife Area | Caroline | 623 | 9-N |
| | Myrtle Grove WMA | Charles | 304 | 10-D |
| | Harry Bowen WMA (on Patuxent River) | Prince Georges | 121 | 10-G |
| | Linkwood WMA | Dorchester | 126 | 10-M |
| | Taylor's Island WMA | Dorchester | 393 | 11-J |
| | Le Compte Wildlife Refuge | Dorchester | 137 | 11-M |
| | Fishing Bay WMA (north section) | Dorchester | 3,673 | 11-L, 11-M, 12-L, 12-M |
| | Fishing Bay WMA (south portion) | Dorchester | 888 | 12-M |
| | Ellis Bay WMA | Wicomico | 773 | 12-M, 12-N |
| | Johnson WMA | Wicomico | 63 | 12-P, 12-Q |
| | Foster Estate Wildlife Management Agreement with Maryland Fish and Game Dept. | Worcester | 2,020 | 12-P |
| | Deal Island WMA | Somerset | 4,028 | 13-M, 13-N |
| | Wellington WMA | Somerset | 158 | 13-O, 13-P |
| | Fairmount WMA | Somerset | 584 | 14-N |
| | Vaughn State WMA | Worcester | 408 | 14-Q |
| | Cedar Island WMA | Somerset | 1,215 | 15-M, 15-N |
| | Pocomoke Sound WMA | Somerset | 3,645 | 15-N |
| | Total (WMA) | | 22,060 | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|-------------------------------------|---|------------------------------------|-----------------|------------------------|
| STATE Other | Loch Raven Reservoir, (city of Baltimore) | Baltimore | 2,868 | 3-H |
| | Univ. of Maryland Plant Research Farm | Montgomery, Prince Georges | 263 | 6-E |
| | Rocky George Reservoir | Montgomery, Prince Georges, Howard | 202 | 6-E, 6-F |
| | Crownsville State Hospital | Anne Arundel | 384 | 6-H |
| | Patuxent River Parcels | Prince Georges | 1,681 | 7-G, 8-G, 9-G |
| | North Basin Reservoir | Anne Arundel | 129 | 7-H |
| | Wye Oak Reservoir | Talbot | 48 | 7-L |
| | Boys' Village of Maryland | Prince Georges | 404 | 9-F |
| | Southern Maryland Public Works Camp | Charles | 40 | 10-F |
| | Salisbury Airport No. 2 | Wicomico | 263 | 12-P |
| | | Total (Other) | 6,282 | |
| | | Total (STATE) | 50,117 | |
| QUASI-PUBLIC or PRIVATE (QPP) | Whitaker Iron Co. 1 & Wildlife Management Agreement | Cecil | 1,818 | 1-L, 1-M, 2-L, 2-M |
| | Broad Creek Memorial Scout Camp | Harford | 485 | 1-J |
| | Camp Rodney Scout Preservation | Cecil | 444 | 2-M |
| | Beltwoods | Prince Georges | 16 | 7-F |
| | CBCES-Smithsonian Institution | Anne Arundel | 808 | 7-H, 8-H |
| | Wye Institute | Queen Annes | 61 | 7-I |
| | Battle Creek Cypress Swamp (TNC) | Calvert | 40 | 11-H |
| | | Total (QPP) | 3,672 | |
| | TOTAL FOR THE STATE OF MARYLAND | | 99,446 | |

State of Virginia

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|----------------------|---|---------------------|-----------------|---------------------------------------|
| NATIONAL Military | | | | |
| Air Force | Langley Air Force Base | Hampton City | 1,212 | 22-I, 22-J |
| Army | Ft. Belvoir Military Reservation | Fairfax | 2,707 | 8-C, 8-D, 9-C, 9-D |
| | US Military Reservation (Radio Tower) | Prince William | 444 | 9-C |
| | A.P. Hill Military Reservation | Caroline | 28,967 | 13-A, 13-B, 13-C, 14-A, 14-B, 14-C |
| | Ft. Lee Military Reservation | Prince Georges | 1,778 | 20-B |
| | Camp Wallace Military Reservation | James City | 81 | 21-G |
| | Ft. Eustis Military Reservation | Newport News City | 2,304 | 21-G, 21-H |
| | US Military Reservation (Plum Tree Island Bombing Range) | York | 1,212 | 21-J, 22-J |
| | US Military Reservation | Northampton | 194 | 21-M |
| | US Military Reservation | Newport News City | 485 | 22-I |
| | Big Bethel Reservoir | Newport News City | 162 | 22-I |
| | Ft. Monroe Military Reservation | Hampton City | 81 | 22-J |
| | US Military Reservation | Isle of Wight | 61 | 23-H |
| | Ft. Story Military Reservation | Virginia Beach City | 364 | 23-L |
| | | Total (Army) | 38,840 | |
| Navy | US Naval Reservation (Dahlgren Weapons Lab) | King George | 1,495 | 12-D |
| | Camp Peary Naval Reservation | York | 3,759 | 19-G, 20-G |
| | Naval Supply Center | York | 1,414 | 20-G, 20-F |
| | US Naval Weapons Station | York | 4,121 | 20-G, 20-H, 21-G, 21-H |
| | US Naval Supply Center | York | 122 | 21-H |
| | Craney Island US Naval Supply Center | Chesapeake City | 1,091 | 23-I, 23-J |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|--|--|--------------------------------------|-----------------|-------------------------------------|
| NATIONAL Military Navy | US Naval Reservation, Little Creek Amphibious Base | Virginia Beach City | 263 | 23-K |
| | US Naval Transmitter Station | Nansemond | 323 | 24-H |
| | Oceana Naval Air Station | Virginia Beach City | 1,010 | 24-L |
| | US Naval Reservation (Fentress Landing Field) | Chesapeake City | 364 | 25-K, 25-L |
| | | Total (Navy) | <u>13,962</u> | |
| Other | US Coast Guard Station | Prince Georges | 525 | 21-B |
| | Quantico Marine Corps Schools | Prince William, Stafford | 25,048 | 9-A, 9-B, 10-A, 10-B, 11-A, 11-B |
| | | Total (Other) | <u>25,573</u> | |
| | | Total (Military) | 79,587 | |
| National Wildlife Refuges (NWR) | Mason Neck NWR | Fairfax | 580 | 9-C |
| | Presquile NWR | Chesterfield | 536 | 19-B, 19-C, 20-B, 20-C |
| | Fisherman's Island Wildlife Refuge | Northampton | 404 | 22-M |
| | | Total (NWR) | <u>1,520</u> | |
| | | Alexandria City | 65 | 8-D |
| National Forests, Parks & Others (NFP) | George Washington Memorial Parkway Sanctuary | Fairfax | 194 | 8-D |
| | George Washington Memorial Parkway Tidal Marshes | | | |
| | Prince William Forest Park | Prince William | 7,353 | 9-A, 10-A, 10-B |
| | District of Columbia Dept. of Corrections, Lorton Reformatory | Fairfax | 1,252 | 9-B |
| | Ft. Hunt National Park | Fairfax | 121 | 9-D |
| | Fredericksburg and Spotsylvania National Military Park | Fredericksburg City, Spotsylvania | 1,010 | 12-A |
| | George Washington Birthplace National Monument | Westmoreland | 159 | 13-E |
| | | | | |
| | | | | |
| | | | | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|--|---|---------------------|-----------------|---------------------------------|
| NATIONAL NPF | Pamunkey Indian Reservation | King William | 404 | 18-D, 18-E |
| | Richmond National Battlefield Park | Hanover, Henrico | 303 | 19-B, 19-C |
| | Harrison Lake National Hatchery | Charles City | 180 | 20-C |
| | Petersburg National Military Park | Prince Georges | 525 | 21-B |
| | Colonial National Historical Park | James City | 3,810 | 20-F, 21-F, 21-G, 21-H, 21-I |
| | Total (NFP) | | 15,376 | |
| | Total (NATIONAL) | | 96,483 | |
| STATE Parks | Bull Run Regional Park | Fairfax | 65 | 9-A |
| | Pohick Bay Regional Park | Fairfax | 5,252 | 9-C |
| | Mason Neck State Park | Fairfax | 768 | 9-C |
| | Westmoreland State Park | Westmoreland | 525 | 13-E, 13-F |
| | York River State Park | James City | 1,212 | 19-G |
| | Chippokes Plantation State Park | Surry | 404 | 21-G |
| | Lake Maury (Mariners' Museum Park) | Newport News City | 283 | 22-I |
| | Seashore State Park | Virginia Beach City | 929 | 23-L |
| | Sleepy Hole Park | Nansemond | 106 | 24-H |
| | Total (Parks) | | 9,544 | |
| Wildlife Management Areas (WMA) | Lands End WMA | King George | 190 | 13-D |
| | Michael Marsh WMA | Accomack | 1,010 | 15-0 |
| | Saxis Waterfowl Management Area and Refuge | Accomack | 2,075 | 15-0 |
| | Parkers Marsh Natural Area | Accomack | 307 | 17-N |
| | Hog Island State Waterfowl Refuge | Surry | 364 | 21-G |
| | Game Refuge Pond (Nebletts Mill Pond) | Sussex | 61 | 22-C |
| | Charles C. Steirly Natural Area | Sussex | 8 | 22-E |
| | Total (WMA) | | 4,015 | |

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|---------------------------------|--|-------------------------------|-----------------|------------------------|
| STATE Other | Gunston Hall | Fairfax | 226 | 9-C |
| | Elko Tract | Henrico | 808 | 19-C |
| | Diascund Creek Reservoir | New Kent | 7,676 | 19-E, 19-F |
| | Eastern State Hospital Reservation | James City | 202 | 20-F |
| | Waller Mill Reservoir | York | 5,656 | 20-G |
| | Skiffles Creek Reservoir | James City, Newport News City | 202 | 21-H |
| | City Reservoir, Hardwoods Mill Reservoir | York, Newport News City | 2,949 | 21-H, 21-I |
| | Collisium Park | Hampton City | 61 | 22-I |
| | Langley View Park | Hampton City | 32 | 22-J |
| | Salt Ponds | Hampton City | 61 | 22-J |
| | Northend Point Natural Preserve | Hampton City | 242 | 22-J |
| | Lake Whitehurst, Norfolk Municipal Gardens and Airport | Norfolk City | 5,252 | 23-K |
| | Lake Burnt Mills Reservoir | Isle of Wight, Nansemond | 455 | 23, 24-G |
| | Lake Prince Reservoir | Isle of Wight Nansemond | 989 | 24-G, -H |
| | Lake Cohoon Reservoir | Nansemond | 459 | 24-G, 25-G |
| | Western Branch Reservoir | Nansemond | 710 | 24-H |
| | Lake Meade Reservoir | Nansemond | 310 | 24-H |
| | | Total (Other) | 26,290 | |
| | | Total (STATE) | 39,849 | |
| PRIVATE | Alexander Berger Memorial Sanctuary | Spots and Caroline | 327 | 13-A |
| | College of William and Mary | Williamsburg City | 355 | 21-G |
| | | Total (Private) | 682 | |
| TOTAL FOR THE STATE OF VIRGINIA | | | 137,014 | |

STATE OF DELAWARE

| <u>Ownership</u> | <u>Name</u> | <u>County</u> | <u>Hectares</u> | <u>Map Coordinates</u> |
|------------------|---------------------------------|---------------|-----------------|------------------------|
| WMA | Petersburg State Wildlife Area | Kent | 5,252 | 6-0 |
| | Nanticoke Wildlife Area | Sussex | 485 | 10-0 |
| | TOTAL FOR THE STATE OF DELAWARE | | 5,737 | |

DISTRICT OF COLUMBIA

| | | | | |
|----------|--------------------------------|------|-----|----------|
| D.C. | Theodore Roosevelt Island | D.C. | 36 | 7-D |
| National | National Arboretum | D.C. | 808 | 7-E |
| Other | and Kenilworth Aquatic Gardens | | | |
| | and Anacostia Park | | | |
| | Fort DuPont Park | | | |
| | and Fort Chaplin Park | | | |
| | and Fort Dairs Park | | | |
| | and Fort Stanton Park | D.C. | 356 | 7-E, 8-E |

TOTAL FOR THE DISTRICT OF COLUMBIA

1,200

GRAND TOTAL

244,025

4. Existing Preserved Natural Areas

Designation of preserved natural areas is difficult since there are different types of preservation and protection. State and federal forests preserve flora and fauna but are subject to cutting, management, and multiple use. State and federal parks have much human use and are subject to management and partial development for recreation. The status of State and federal wildlife management areas and refuges is also variable since they preserve wildlife and flora, but are subject to management and change.

There are 17 sites (Table 3) which may be considered as preserved natural areas, but the status of some of these areas are not clear, particularly those preserved by State departments as forests, parks, or refuges. This list should be considered as very tentative, since some of the areas may not qualify as fully preserved natural areas.

The Nature Conservancy sites, the Natural Landmark areas, and the Smithsonian Institution areas can be considered as preserved natural areas. The State of Virginia has designated three natural areas--Charles C. Steirly Natural Area, Parkers Marsh Natural Area, and Seashore Natural Area. The latter is also a State Park with some tourist facilities and use.

TABLE 3. PRESERVED NATURAL AREAS

| | Size of Area (Hectares) | Owner | Type of Area | Preservation |
|--|----------------------------|-------------------------|-------------------------|-------------------|
| Hellen Creek Hemlock Preserve, Md. | 36 | Nature Conserv. | Hemlock Outlier | Good |
| Alexander Berger Memorial Sanctuary, Va. | 346 | " | Diverse Veg. & Wildlife | Good |
| Hambleton Island | 11 | " | Virgin Cedar & Pine | Good |
| Battle Creek Cypress Swamp, Md. | 40 | " | Cypress Outlier | Good; Landmark |
| Charles C. Steirly Natural Area, Va. | 8 | State of Virginia | Cypress & Tupelo | Good |
| Long Green Creek Valley and Sweathouse Branch, Md. | 101 | State of Md. Park | Forests and Rivers | Good |
| Belt Woods, Md. | 16 | Episcopal Church | Virgin Mature Forest | Proposed Landmark |
| Parkers Marsh Natural Area, Va. | 307 | State of Virginia | Tidal Marsh | Good |
| Patuxent River Wildlife Research Center, Md. | 286 | BSFW | Forests and Wildlife | Good; SAF Area |
| Seashore Natural Area, Va. | 606 | Va. State Park | Dunes and Forests | Good; Landmark |
| Mill Creek Bird Sanctuary, Md. | 62 | Quasi-Public | Oak-Pine Forest | Good |
| Hock Tract, Md. | 6 | Md. State Road Com. | Virgin Forest | Good |
| Corcoran Tract (Part of Sandy Point State Park), Md. | 56 | Md. State Forest & Pk | Virgin Oak & Pine | Good |
| Smithsonian Chesapeake Bay Center for Environmental Studies, Md. | 808 | Smithsonian Institution | Forests & Marshes | Good |
| LeCompte Bryant Fox Squirrel Refuge, Md. | 137 | Md. Dept. Game & Fish | Hardwood & Softwood | Good |
| Pocomoke River Swamp, Md. (over 7,000 ha.) | 202 | Quasi-Public & State | Cypress & Cedar Swamp | Partly Preserved |
| Poplar Island, Jefferson and Coaches Islands, Md. | 50 | Smithsonian Institution | Forest & Marshes | Good |
| Total | 3,078 | | | |

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